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CONTROL DATA

CDC® CYBER CHANNEL COUPLER

FR205-B

FV720-B

GENERAL DESCRIPTION
OPERATION
INSTALLATION AND CHECKOUT
THEORY OF OPERATION
DIAGRAMS
MAINTENANCE
SAMS PROCEDURES
PARTS DATA
WIRE LISTS

HARDWARE MAINTENANCE MANUAL

Manual History

Previous Revision	System Level	Date
A	Manual Released	August 1987
B	Manual revised	February 1988
C	Manual revised	February 1988
D	Manual revised	May 1988
E	Manual revised	November 1988

Revision E reflects Engineering Change Order 50116, revises the initial start-up procedure.

Many of the changed diagram pages are not marked with change bars. The reason is that the change consists of revisions to the page header, which is a marker to locating specific diagrams in the manual.

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Equipment Supported in This Manual

This manual supports the following equipment at the series levels listed, assuming all field change orders (FCOs) against the equipment have been installed. Compare the list of FCOs in this table with the list in your equipment FCO log. If the two lists match, this manual accurately reflects your equipment.

Equipment	Series	FCOs	Comments
FR205-B	01	-	Released.
	02	-	ECO 49260
	03	-	ECO 49315
FV720-B	01	-	Released.
	02	-	ECO 49315

About This Manual

This manual provides hardware maintenance information for the CONTROL DATA® FR205-B and FV720-B CYBER Channel Coupler (called the CCC or the coupler in this manual). The FR205-B is the basic coupler and the FV720-B is an optional coupler mounted in the same cabinet. The information in this manual is organized into the following major sections.

- Section 1 - General Description
- Section 2 - Operation
- Section 3 - Installation and Checkout
- Section 4 - Theory of Operation
- Section 5 - Diagrams
- Section 6 - Maintenance
- Section 7 - SAMs
- Section 8 - Procedures
- Section 9 - Parts Data
- Section 10 - Wire Lists

Other manuals providing reference and site preparation information for the coupler are listed as follows. Also listed are the subsystem user's guides that contain microcode information applicable to a specific configuration of which the coupler is a part. All manuals may be ordered from:

Control Data Corporation
Literature and Distribution Services
304 North Dale Street
St. Paul, MN 55103

Manual Title	Publication Number
CYBER Channel Coupler FR205-A/B, FV720-A/B Hardware Reference Manual	60459170
Computer Systems Site Preparation Peripheral Data	60275300
895 Disk Storage Subsystem User's Guide	60459190
NOS 2 Installation Handbook	60459320
5870 Non-Impact Printer Subsystem User's Guide	60461360
7990 Masstor Tape Storage Subsystem Reference Manual	60462000

Manual Title	Publication Number
698 CYBER Magnetic Tape Subsystem (CMTS) User's Guide	60000009
Concurrent Maintenance Library (CML) Reference Manual	60455980
MSL Offline Maintenance Software Library Reference Manual	60456530
Hardware Performance Analyzer (HPA) User's Reference Manual	60459460
TTL Key to Logic Symbols Customer Engineering Manual	60406000

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General Description 1

Introduction

The CDC® CYBER Channel Coupler (the coupler) contains the hardware necessary to connect a CDC CYBER 170/180 Computer System to an attached peripheral subsystem that meets the requirements of a Federal Information Processing Standards (FIPS) device. The coupler requires that different microcode be loaded into its memory for it to control different types of subsystem devices, for example, disk, tape, or printer subsystems. Controlware information is provided in separate subsystem user guides applicable to the type of subsystem being used. Publication numbers for the various subsystem user guides are listed in About This Manual.

For information on the CYBER 170/180 peripheral processor programming functions applicable to the coupler, refer to the the CYBER Channel Coupler Hardware Reference Manual also listed in About This Manual.

The following paragraphs provide a basic description of the hardware configuration, physical description, functional description, and equipment specifications of the coupler.

Hardware Configuration

The coupler connects to a peripheral processor (PP) channel of a CYBER 170/180 Computer System and a FIPS-compatible disk, tape, or printer subsystem. The coupler consists of a data bus, processor, random-access memory (RAM), programmable read-only memory, (PROM), CYBER channel interface, FIPS device interface, FIPS power control circuit, and transfer logic. These elements are shown in block diagram form in figure 1-1 and described in the following paragraphs.

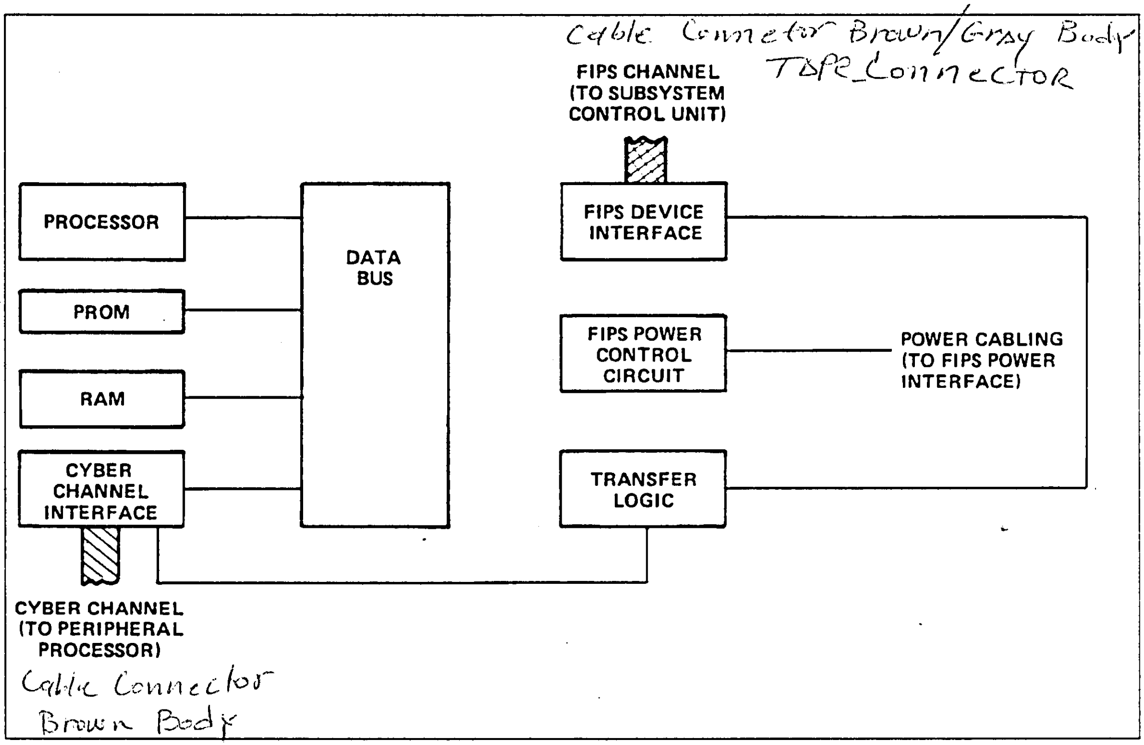
Cable Connector Brown/Gray Body
FIPS CHANNEL (TO SUBSYSTEM CONTROL UNIT)
Tape Connector
PROCESSOR
PROM
RAM
CYBER CHANNEL INTERFACE
DATA BUS
FIPS DEVICE INTERFACE
FIPS POWER CONTROL CIRCUIT
POWER CABLING (TO FIPS POWER INTERFACE)
TRANSFER LOGIC
CYBER CHANNEL (TO PERIPHERAL PROCESSOR)
Cable Connector
Brown Body

Figure 1-1. Coupler Block Diagram

Data Bus

The data bus interconnects the various components (processor, CYBER channel interface, FIPS device interface, and both the RAM and PROM) of the coupler. Use of the data bus is divided equally between the processor, CYBER channel interface, and the FIPS device interface.

Processor

The processor is an internally programmed, 16-bit device that decodes function commands from the PP and issues instructions that allow the functions to be performed. The processor consists of two major sections; a control section and an arithmetic section. The control section processes the function commands and sequences the various instructions. The arithmetic section performs all related arithmetic operations.

Random-Access Memory

RAM contains 64K words of memory having a maximum read access time of 45 ns. Each word is 16 bits long. The addresses available for use are 0000_{16} through $FFFF_{16}$, except addresses 8000_{16} through $8FFF_{16}$, $C000_{16}$ through $CFFF_{16}$ and $E000_{16}$ through $EFFF_{16}$ must not be used for RAM. The microcode program is loaded into the RAM from the PP for subsequent use by the processor.

Programmable Read-Only Memory

The PROM contains 4096 words. Each word is 16 bits long. The addresses available for use are 8000_{16} through $8FFF_{16}$. Firmware consisting of autoload functions and internal diagnostics is permanently coded in the PROM.

CYBER Channel Interface

The CYBER channel interface links the CYBER 170/180 PP channel to the processor and memory of the coupler. This PP channel is connected to the coupler via two 19-pin coaxial cables. All functions received from the PP (except the X5XX and X7XX diagnostic functions or functions that contain a channel parity error) are routed to the processor. The processor decodes the function and directs the CYBER channel interface to respond to the function. No response is sent to the PP if a parity error is detected.

After sending an inactive signal to the PP channel in response to a function, the CYBER channel interface waits for the processor to inform it as to the type of write or read operation that will follow (if any).

The CYBER channel interface performs six different functions under the direction of the processor, and seven diagnostic functions without processor direction. Refer to the CYBER Channel Coupler FR205-A/B, FV720-A/B Hardware Reference Manual for detailed information on these functions.

FIPS Device Interface

The FIPS device interface contains the receivers, transmitters, and control logic to drive the attached peripheral device. It also provides code translation and block ID generation for tape control units.

The FIPS device interface does not use any interrupts. Therefore, no interrupt logic is connected and all logic associated with interrupts is disabled where possible.

FIPS Power Control Circuit

The FIPS power control circuit controls the power sequencing of the attached peripheral devices by applying and removing power in sequential steps. This stepping of power (on or off) decreases the overall system power requirements and power surge noise generation. Two FIPS power control switches are provided on the power control panel to power two separate equipment chains. Each switch controls the power sequence to its respective peripheral device in accordance with the FIPS Channel Level Power Control Interface standard.

Transfer Logic

The transfer logic provides the necessary hardware to transfer data from the CYBER channel interface through memory to the FIPS device interface. This is accomplished through buffer registers. During the transfer, data is written into a 512-byte buffer by one interface and read from that buffer by the other interface.

Physical Description

Figure 1-2 shows the location of the major components of the coupler. These are briefly described in the following paragraphs.

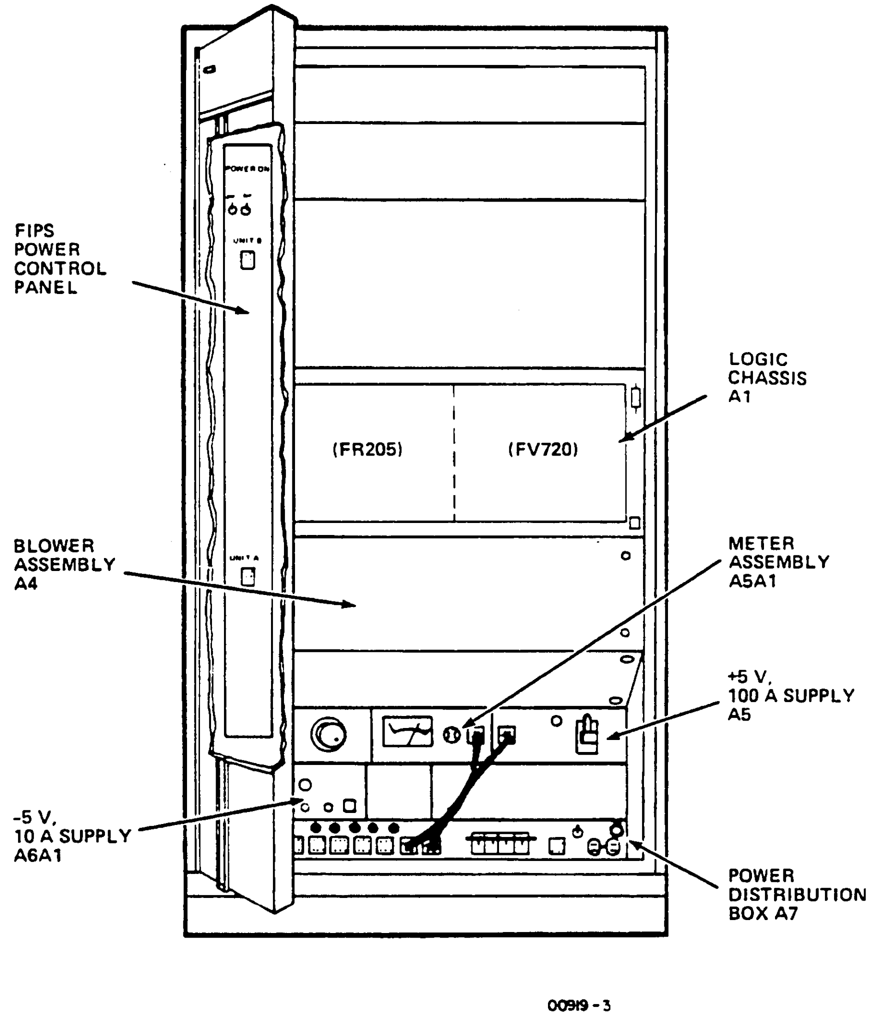

Figure 1-2. Coupler Component Locations

Cabinet

The coupler is housed in a single-wide trimline cabinet. Doors and removable panels provide access for component maintenance. A cooling blower in the base of the cabinet draws room air through a filter, circulates it around the power supplies and logic modules, and forces the air out exhaust ducts at the top of the cabinet.

The cabinet for the basic FR205-B coupler can accommodate an additional coupler as an option. The optional coupler is equipment number FV720-B and consists of logic cards only. The cabinet is prewired to accept the optional coupler.

Power Supplies

Most power supply components are located near the base of the cabinet. The coupler contains a −5 V and a +5 V dc power supplies. The power supplies operate from 120/208-V, 400-Hz, 3-phase power. A vertical bus bar carries the +5 V to logic chassis and the −5 V is routed directly to the logic chassis from a terminal board.

The blower operates from 120-V, 50/60-Hz, 1-phase power. The blower contains an airflow sensor to shut down the 400-Hz power in case of blower failure or excessive high ambient temperatures.

Logic Chassis

The logic chassis contains a fiberglass backpanel. Vertical rows of pins protrude from the back of the backpanel, pass through the backpanel, and attach to connectors on the front of the backpanel. The logic modules slide into card guides at the front of the logic chassis, and edge connectors on the logic module insert into the backpanel connectors. A wire wrapping technique is used to interconnect the backpanel pins.

Logic Modules

The coupler logic is contained on 70-pak printed circuit logic modules. Up to 70 integrated circuits (ICs) are mounted on each logic module in a 5 by 14 IC matrix.

Two 90-pin connectors are located on the rear edge of the logic module. The top 90-pin connector has pin designations of P1A01 through P1A45 (from top to bottom) on one side of the module and P1B01 through P1B45 on the other side. The bottom 90-pin connector has pins that are arranged in the same manner, but are designated as P2A01 through P2A45 and P2B01 through P2B45.

Test points are located on the front edge of the module. The test points are designated 01 through 51 from top to bottom on the module.

Logic Types

The coupler logic modules use transistor-transistor logic (TTL) ICs. The TTL circuits are packaged in 14-pin, 16-pin, or 20-pin dual in-line ICs. The TTL logic levels are +2.0 to +3.3 V for a high (logical 1), and from +0.2 to +0.8 V for a low (logical 0).

Signal Connections

Signals between logic modules are transmitted via the wire-wrap interconnections on the backpanel of the logic chassis. Signal connections from the FIPS device interface connectors use twisted-pair wires that are wire-wrapped to the backpanel pins. Signal connections from the CYBER channel interface connectors use twisted-pair wires that insert into plastic block connectors that fit over the backpanel pins.

Maintenance Board

A maintenance board at location A14 is provided to read the memory locations of either coupler that may be installed in the cabinet. A thumbwheel on the board is used to specify the desired memory address, and the contents of that address are displayed in hexadecimal by four groups of four LEDs on the board.

FIPS Power Control Panel

The FIPS power control panel contains two power switches and connectors that control application of power to two separate peripheral device chains. Power is applied in a specific control sequence as directed by applicable Federal Interface Processing Standards.

Functional Description

The CYBER channel coupler is driven by a CYBER 170/180 series PP. Each coupler can be accessed by only one PP channel. All communication between the PP and the coupler is initiated by function codes from the PP. All function codes are 12 bits long. The upper three bits identify the equipment controller connected to the coupler. The coupler microcode converts the PP functions into commands for controlling the attached subsystem devices and also converts subsystem status conditions to general and detailed status for use by the operating system. The functions have a PP timeout of approximately 1 s to avoid hanging the channel in a full condition should a hardware logic failure occur. The coupler replies to all legal function codes described in the applicable subsystem user's manual.

Equipment Specifications

Equipment specifications for the coupler are as follows.

Power Requirements

Power requirements are shown in the following matrix.

TYPE	POWER		
	V ac	Hz	PHASE
9 A/PHASE 1.1 kVA	120	60	1
5 A/PHASE 0.75 kVA	220	50	1
1.8 A/PHASE 0.64 kVA	120/208	400	3

Environmental Conditions

	Temperature	Relative Humidity
Operating:	15°C to 32°C (59°F to 90°F)	20 to 80%
Nonoperating:	-40°C to 60°C (-40°F to 140°F)	5 to 95%

Physical Characteristics

Height:	1676 mm (66 in)	Depth:	635 mm (25 in)
Width:	736 mm (29 in)	Weight:	136 kg (300 lb)

I/O Cable Information

The following table describes the I/O cables and their routing from the coupler.

From	To	Quantity	Cable P/N	Length
Coupler	FIPS Device	3	774750XX[1]	61 m (200 ft) max
Coupler	PP Channel	2	19191600	19.8 m (65 ft)

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[1] These cables are shielded and have a quick disconnect terminal fastened to the shield at each end. Refer to section 3, Installation and Checkout, for a tabulation of various cable lengths.

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Operation

Introduction

This section provides information on the controls and indicators of the CYBER Channel Coupler (the coupler) and their related operating procedures. For similar information on the various subsystem peripheral devices that may be attached to the coupler, refer to the applicable Control Data publication for that device.

Controls and Indicators

The coupler provides several controls and indicators for normal operation and for maintenance checks and adjustments. These are located on the front panel of the the coupler (see figure 2-1) and also on internal logic modules.

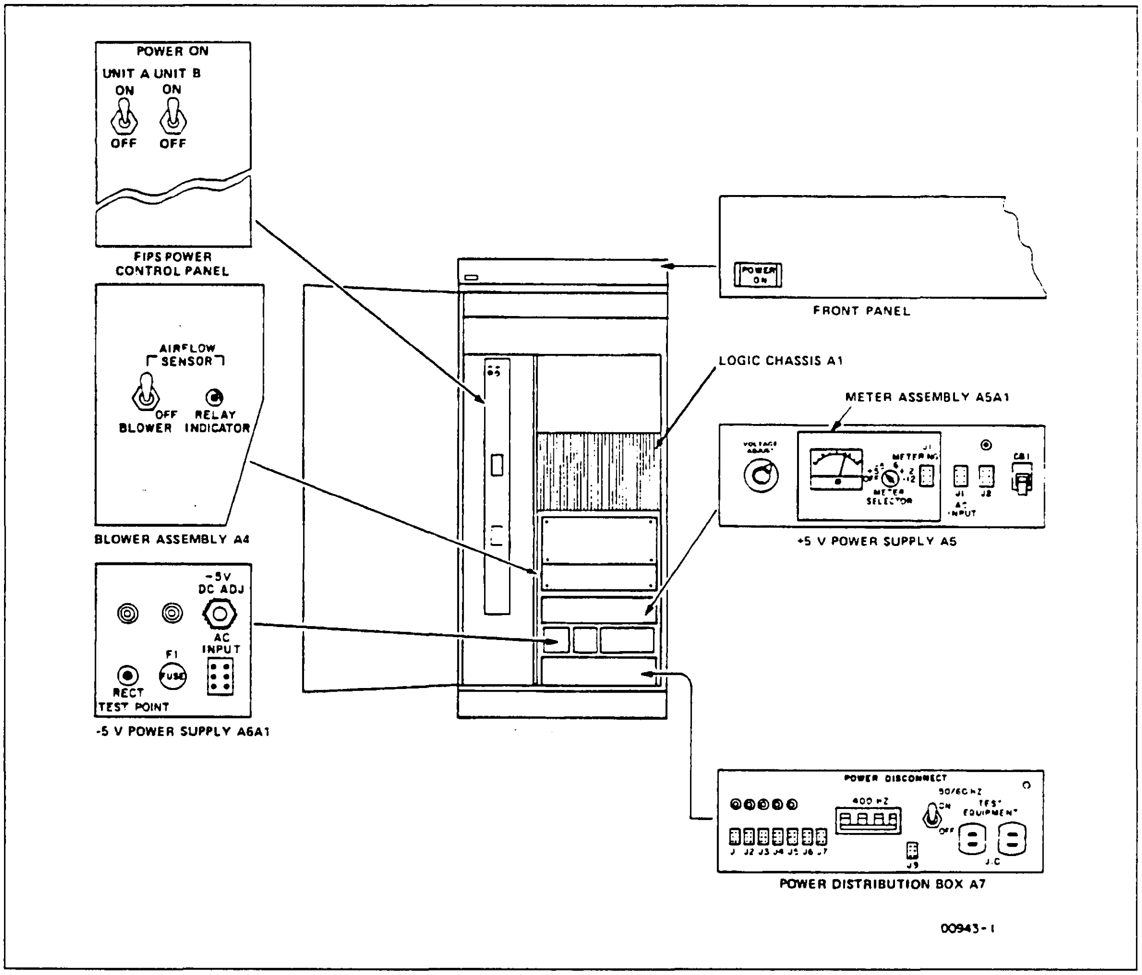

Figure 2-1. Front Panel Control and Indicator Locations

Panel-Mounted Controls and Indicators

The panel-mounted controls and indicators used to apply/remove coupler power and to perform voltage checks and adjustments are shown in figure 2-1 and described in the following paragraphs.

POWER ON Indicator

This indicator lights when the dc power supplies in the coupler are operating.

50/60-HZ POWER DISCONNECT Switch

This switch, located on the power distribution panel, applies 50/60-Hz input power to the coupler blower motor when placed in the ON position and removes power from the blower motor when placed in the OFF position.

400-HZ POWER DISCONNECT Switch/Circuit Breaker

This switch/circuit breaker, located on the power distribution panel, applies 400-Hz input power to the coupler power supplies when placed in the ON position and removes this power when placed in the OFF position. The integral circuit breaker provides overload protection to the +5 V and −5 V power supplies.

Circuit Breaker CB1 (Location A6A3)

This circuit breaker protects the +5 V power supply at location A6A3 from overload.

VOLTAGE ADJUST Control (Location A5)

The VOLTAGE ADJUST control is used for maintenance purposes to adjust the output voltage of the +5 V power supply at location A5.

Circuit Breaker CB1 (Location A5)

This circuit breaker protects the +5 V power supply at location A5 from overload.

Percent Meter (Location A5A1)

The percent meter at location A5A1 indicates a percentage difference of the nominal input voltage for that input. The METER SELECTOR switch determines which dc voltage is being monitored.

METER SELECTOR Switch (Location A5A1)

This switch selects which dc voltage is to be monitored by the percent meter. Only the +5 V and −5 V positions are used.

-5 V DC ADJ Control (Location A6A1)

This control is used for maintenance purposes to adjust the output voltage of the -5 V power supply at location A6A1.

FUSE F1 (Location A6A1)

This fuse provides overload protection for the −5 V power supply at location A6A1.

AIRFLOW SENSOR/BLOWER OFF Switch (Location A4)

This switch tests the operation of the airflow sensor when held in the BLOWER OFF position. This removes 50/60-Hz power from the blower.

AIRFLOW SENSOR RELAY INDICATOR (Location A4)

The airflow sensor relay indicator indicates that the high temperature switch in the airflow sensor has opened and deenergized the relays supplying 400-Hz power.

POWER ON UNIT A and B Switches (Power Control Panel)

These switches are used to apply power in a sequentially stepped fashion to two separate equipment chains that may be connected to the subsystem. The power sequence circuits regulate the initial subsystem electrical load required by the attached subsystem devices during the power application.

Logic Module A04 Switches and Indicators (Cyber Interface)

Logic module A04 contains a MASTER CLEAR pushbutton switch (SW2), LED indicators 1 through 6, and microswitches SW1-1 through SW1-6. Their functions are as follows.

MASTER CLEAR Pushbutton Switch (SW2)

This switch clears the coupler and starts execution of the internal diagnostics. An autoload function or a diagnostic function initiated from the PP also causes execution of the internal diagnostics.

LED Indicators 1 Through 6

These LED indicators are designated 1 through 6 from top to bottom of logic module A04. They provide the following indications.

LED 1	Channel function parity error.
LED 2	This LED lights and then goes out when the CYBER channel interface and processor interaction diagnostic completes a successful check of the various interactions between this interface and the processor. This LED remains lit if the interaction diagnostic checks fail.
LED 3	Memory parity error detected by the CYBER channel interface.
LED 4	Deadman timeout.
LED 5	Processor parity error.
LED 6	This LED lights and then goes out when the internal diagnostic completes a successful check of the CYBER channel interface. This LED remains lit if the interface fails the check.

Switches SW1-1 Through SW1-8

These microswitches are used for the following functions. A switch in the OFF position indicates a set (logical 1) input to the coupler logic.

SW1-1 Enables odd parity checking of all CYBER channel data and functions when placed in the OFF position. Disables parity checking when in the ON position.

SW1-2 through SW1-4 Defines the equipment types connected to the coupler. Present switch settings for existing equipment types are as follows. All other switch position combinations are undefined.

SW1-2	SW1-3	SW1-4	Equipment Type
OFF	OFF	OFF	Disk (3330/3350)
OFF	OFF	ON	Tape (STC 3800/4600)
OFF	ON	OFF	Disk (895)
OFF	ON	ON	NIP Printer (5870)
ON	OFF	OFF	MASSTOR (7990)
ON	OFF	ON	Tape (698)

SW1-5 Enables the coupler to loop on its internal diagnostic and never reach its idle routine when placed in the ON position. This is used for maintenance purposes only. Looping does not occur when switch is in the OFF position.

SW1-6 Not used.

SW1-7 Enables FIPS loop-back diagnostics using test connectors on the FIPS channel.

SW1-8 Repeats FIPS loop-back diagnostics.

Logic Module A06 Indicators (Processor Controll)

This module contains two LED indicators. The upper LED lights to indicate that the processor is running. The lower LED lights when a processor memory parity error occurs.

Logic Module A07 Indicator (MEMORY)

This module contains one LED indicator. The LED lights and then goes out when the processor diagnostic completes a successful check of the processor. It remains lit if the processor fails the diagnostic.

Logic Module A11 Indicators (FIPS INTERFACE)

This module contains two LED indicators. The upper LED lights and then goes out when the FIPS device interface diagnostic completes a successful check of the interface. It remains lit if the interface fails the diagnostic.

The lower LED indicates that a memory parity error has been detected by the FIPS device interface.

Logic Module A12 Indicators

This module contains two LED indicators. The upper LED lights and then goes out when the FIPS device interface diagnostic completes a successful check of the interface. It remains lit if the interface fails the diagnostic.

The lower LED is not used.

Logic Module A14 Switches and Indicators

This module is the maintenance board. Figure 2-2 shows the location of the following switches and indicators on the maintenance board.

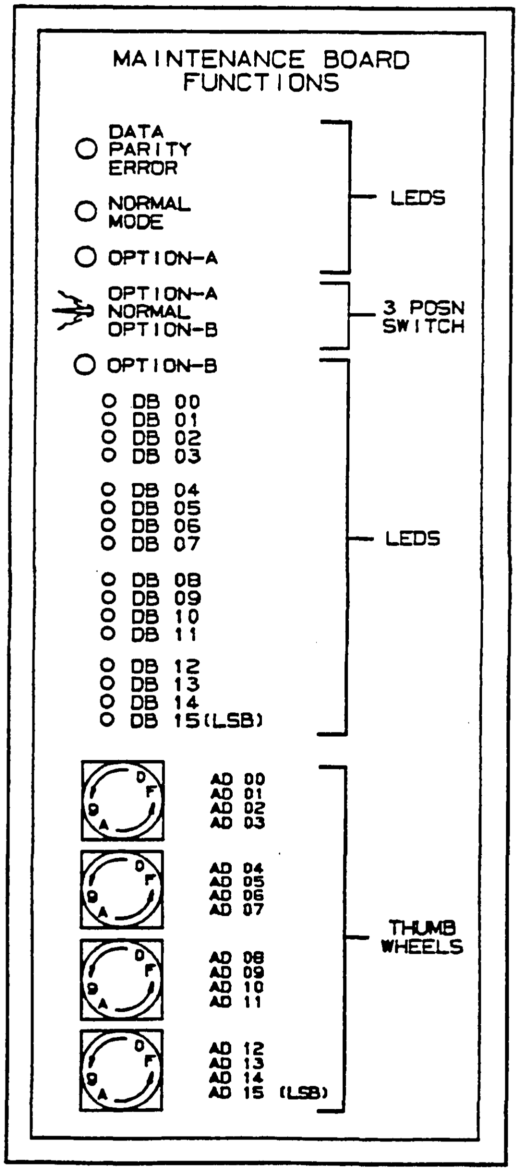

Figure 2-2. Maintenance Board Switch and Indicator Locations

DATA PARITY ERROR Indicator

This red LED indicates a parity error.

NORMAL MODE Indicator

This green LED indicates that either the FR205 or FV720 coupler is selected in on-line mode when NORMAL is selected with the OPTION-A, NORMAL, OPTION-B switch.

OPTION-A Indicator

This yellow LED indicates that the FR205 was the last coupler that had written to the memory display when NORMAL is selected with the OPTION-A, NORMAL, OPTION-B switch.

OPTION-B Indicator

This yellow LED indicates that the FV720 was the last coupler that had written to the memory display when NORMAL is selected with the OPTION-A, NORMAL, OPTION-B switch.

OPTION-A, NORMAL, OPTION-B Switch

This switch selects which coupler to read memory locations from at the 16-LED memory display for maintenance (off-line) purposes. In the OPTION-A position, the FR205 is selected and neither the NORMAL, OPTION-A, or OPTION-B LED is illuminated. In the OPTION-B position, the FV720 is selected and neither the NORMAL, OPTION-A, nor OPTION-B LED is illuminated. In the NORMAL position, the maintenance board functions as a memory-mapped display shared by either coupler and the NORMAL or either OPTION-A or OPTION-B LEDs are illuminated. That is, either coupler can write to the 16-LED memory display. However, the FR205 coupler has priority over the FV720.

Memory Display (Bits DB00 through DB15)

The memory display is a 16-LED display that shows the contents of the selected memory address. The content is displayed in hexadecimal notation.

Address Select Thumbwheel Switches (Bits AD00 through AD15)

These four switches specify which memory address is to be read from the coupler selected by the OPTION-A, NORMAL, OPTION-B switch. The contents of the address are displayed in hexidecimal by the 16-LED memory display on the maintenance board.

Operating Procedures

The following paragraphs provide general operating procedures applicable to the coupler.

Power Application

Power application to the coupler is controlled by the 50/60 HZ and 400 HZ POWER DISCONNECT switches located on the power distribution panel at the front of the coupler. Power application to the attached subsystem devices is controlled by the POWER ON UNIT A and POWER ON UNIT B switches located on the power control panel of the coupler. During subsystem installation, the CE performs the cable routing and switch settings required for power sequencing. Thereafter, the operator normally controls application of power to the subsystem from the power control panel of the coupler.

Microcode Autoloading

The appropriate microcode, used to control the attached peripheral devices, must be autoloaded into the coupler RAM before complete subsystem operation can occur. The following functions reside permanently in the coupler processor ROM to enable autoloading of the microcode.

0414_8	Autoload coupler microcode from PP
$06uu_8$	Autoload coupler microcode from disk

These functions are described in detail in the following paragraphs. The prescribed autoload procedure depends on site operating procedures, the operating system being used, the computer system configuration, and whether or not the computer system is running. Refer to the appropriate operating system handbook for Control Data recommended procedures (for example, for NOS, refer to the NOS 2 Installation Handbook listed in About This Manual).

Autoload Coupler Microcode From PP (0414_8)

This function initiates a microcode autoload from the PP to the coupler. During execution, the CYBER channel interface decodes the 0414_8 function, lights four LEDs located on internal PC boards, stops the coupler processor, and causes the FIPS device interface to go to an idle loop. The CYBER channel interface then executes its UDI diagnostic. If this diagnostic runs successfully, the CYBER channel interface turns off its LED (LED 6 on module A04) and starts the processor executing firmware microcode at PROM address 8000_{16}.

The first code to execute is an instruction test. If the instruction test runs OK, the processor turns off its LED (on module A07) and executes a processor/CYBER channel interface interaction test. If the processor/CYBER channel interface interaction test executes without error, a third LED is turned off (LED 2 on module A04). Following this, the processor instructs the FIPS device interface to execute its UDI diagnostic and turn off its LED if successful (upper LED on module A12).

If all the preceding diagnostics execute without error, a reply is generated for the autoload function. The lower 8 bits of each consecutive 12-bit microcode word are then transferred from PP memory to alternate upper and lower 8-bit byte positions in coupler RAM beginning at location 0030_{16}. This method uses two 12-bit PP memory words to load each 16-bit coupler RAM word. The coupler remains in autoload mode until the PP disconnects the channel.

A partial autoload of four words or less can be performed to recover from channel timeout errors. Program execution is returned to the idle loop following a partial autoload.

During full autoload, the coupler firmware does a memory test after the eighth word is received from the channel. If the test is successful, the firmware completes the autoload. After the PP disconnects the channel, the coupler firmware calculates a checksum from the microcode data loaded into the coupler RAM. If there is a memory test error or a checksum error, the coupler processor stops and the channel is deactivated by the deadman timer. If there are no errors, the coupler processor and FIPS interface interaction tests are executed.

These tests are part of the downloaded microcode. If the interaction tests fail, either the equipment switches are set wrong, the microcode number in binary is wrong, or general status is set to 5XXX, where XXX is an octal error code. Refer to the appropriate subsystem user's guide for a listing of applicable error codes. If there are no errors, a release is issued to all devices connected to the coupler, the general status is set to zero, and the coupler processor goes to an idle loop to wait for additional functions from the PP.

Autoload Coupler Microcode From Disk ($06uu_8$)

NOTE

The microcode must have previously been written on the disk in full track mode (1:1 interface).

The autoload coupler microcode from disk function ($06uu_8$) causes the coupler to execute the same diagnostics as in a full autoload microcode from PP function (0414_8). If the diagnostics execute without error, the processor firmware checks the coupler hardware switches to determine which device to load from. If switches SW1-2, SW1-3, and SW1-4 (located on the A04 module of the coupler) are off, the disk subsystem is selected and the device number specified in the function code is positioned to the factory map cylinder. When the device is on-cylinder, data is read from the disk into coupler RAM.

After the coupler RAM is loaded with microcode data, the coupler firmware calculates a checksum and compares it with the correct value. If it doesn't compare, then either a function parity error has occurred, the microcode number is wrong, or the coupler couldn't load from the device. For these cases, an autoload function reply is not returned to the PP. If the coupler RAM is successfully loaded, an autoload function reply is returned to the PP, the disk device is released, and a jump is made to the coupler ROM idle loop.

Microcode Initialization/Disk Pack Initialization

Refer to the applicable subsystem user's guide listed in About This Manual for the microcode initialization/disk pak initialization procedures that apply to the attached peripheral devices.

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Installation and Checkout 3

This section provides information necessary to install and checkout the CYBER Channel Coupler (the coupler). The information is presented under the following major headings.

- Site Preparation Information
- Crating/Uncrating
- Installation Procedure
- Initial Start-Up Procedure
- CYBER Channel Clock Tuning Verification Procedure
- FV720-B Option Installation Procedure

Site Preparation Information

Information that applies to the coupler is found in the manual for Computer Systems Site Preparation Peripheral Data listed in About This Manual.

Crating/Uncrating

Refer to procedure 8:504:00 in the Customer Engineering Operating Manual when necessary to crate the coupler for shipment. This procedure provides the latest information on obtaining packaging materials and instructions for crating.

No special procedures are required when uncrating the coupler.

Installation Procedure

The following paragraphs provide information on space considerations, input power connections, signal cable connections, and hardware unique identifier (HUI) wiring to be used when installing the coupler.

Space Consideration

The location of the coupler must allow enough room to open the front and rear doors to their maximum position for operating and maintenance purposes. Refer to the Computer Systems Site Preparation Peripheral Data listed in About This Manual for a floor plan layout of the coupler.

Input Power Connections

Refer to figure 3-1 and perform the following steps to connect input ac power cables to the coupler.

1. Verify that site ac input power circuit breakers feeding the coupler are in the OFF position. Also check that 400-HZ and 50/60-HZ POWER DISCONNECT switches on power distribution box A7 of coupler are in the OFF position.

2. Remove six mounting screws and lockwashers from rear cover of power distribution box A7 and remove cover.

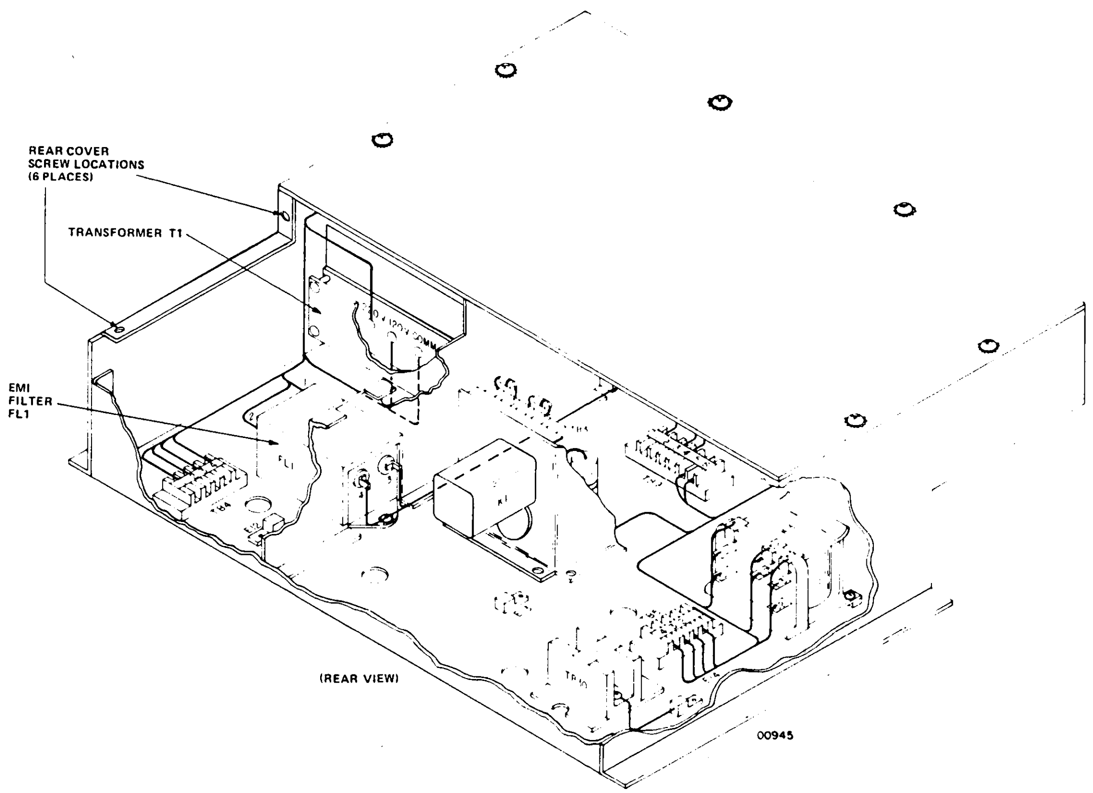

Figure 3-1. Power Distribution Box Component Locations (Assembly A7)

3. Connect a ground strap from the computer system grid ground to A7TB30.

4. Connect a 1-phase power cable to power distribution box A7 terminals according to the following pattern, as applicable. The customer is responsible for providing power cables.

120-V, 50/60-Hz Power Cable	A7 Terminal
Neutral (white)	TB4-1
Phase 1 (black)	TB4-2
Safety ground (green)	E12

220/230/240/250-V 50/60-Hz Power Cable	A7 Terminal
Neutral (white)	TB4-3
Phase 1 (black)	TB4-4
Safety ground (green)	E12

5. For 220- through 250-V units only, connect wire from A7S1-8 to appropriate 220-, 230-, 240-, or 250-V terminal of A7T1.

6. Connect a 120/208-V, 400-Hz, 3-phase power cable to power distribution box A7 terminals as follows.

120/208-V, 400-Hz Power Cable	A7 Terminal
Neutral (white)	TB5-1
Phase 1 (black)	TB5-2
Phase 2 (red)	TB5-3
Phase 3 (orange)	TB5-4
Safety ground (green)	E13

7. Replace rear cover on power distribution box.

8. Connect plug ends of power cables to appropriate site power outlets.

I/O and EPO Cable Installation

Figure 3-2 shows the location of the coupler I/O and EPO cable connectors.

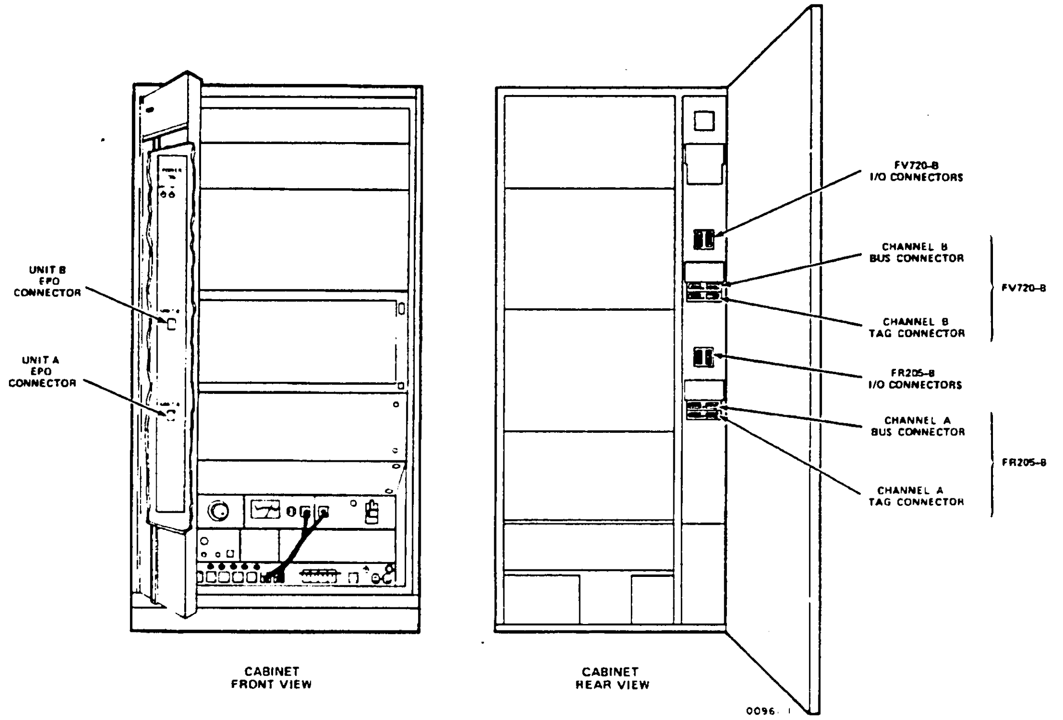

Figure 3-2. Coupler I/O and EPO Cable Connector Locations

The coupler-to-FIPS device BUS and TAG and EPO cables must be either foil-shielded or braid-shielded with a quick-disconnect terminal fastened to the shield at each end.

Table 3-1 lists CDC part numbers for various lengths of acceptable shielded cables.

Table 3-1. Cable Lengths and CDC Part Numbers

Length	I/O Cable Foil Shield	I/O Cable Braid Shield	EPO Cable Braid Shield
6.1 m (20 ft)	77475035	77475043	72920803
9.2 m (30 ft)	77475037	77475045	72920805
12.2 m (40 ft)	77475039	77475047	72920807
24.5 m (80 ft)	77475079	77475055	72920815
30.5 m (100 ft)	77475083	77475059	72920819
45.7 m (150 ft)	None	None	72920824
61 m (200 ft)	None	None	72920829

Perform the following steps to install I/O nd EPO cables.

1. Connect two I/O cables (CDC 19191600) between FR205-B coupler INPUT and OUPUT connectors and PP.
2. Connect two I/O cables (CDC 774750XX) between FR205-B coupler CHANNEL A BUS and TAG connectors and external FIPS device. (Connect dark gray connectors to FR205-A and light gray connectors to external FIPS device.) Be sure to connect quick-disconnect terminals from cable shields to spade lugs mounted next to I/O connectors.
3. Install two terminator assemblies: CDC 75268900 at BUS connector, and CDC 94390700 at TAG connector of last external FIPS device.
4. Connect EPO cable (CDC 729208XX) between UNIT A connector of coupler and EPO connector of external FIPS device.

Hardware Unique Identifier Wiring

The hardware performance analyzer (HPA) requires that each coupler have a hardware unique identifier. The HUI consists of 8 bits that form two hexadecimal characters. The site manager must select the hexadecimal code, being certain that each number selected is unique at the site.

Wire the HUI as follows.

1. Select the number.
2. Locate the following pins on the coupler backpanel at chassis location A04.

Pin	Bit Position
P1B21	2^7
P1A20	2^6
P1B19	2^5
P1A18	2^4
P1A21	2^3
P1B26	2^2
A1A19	2^1
A1B18	2^0

3. Remove any wires attached to these pins.
4. Ground pins as necessary by attaching a wire to the selected pin and to a pin on row C or D of the backpanel. Grounded pin is the equivalent of a logical 1; open pin is a zero. For example, to assign an HUI of 17_{16}, ground pins P1A18, P1B26, P1A19, and P1B18.

Initial Start-Up Procedure

Perform the following steps to initially start up the coupler following installation. Refer to section 2 for a figure showing the location of the switches and voltage adjust controls.

1. Turn VOLTAGE ADJUST control on +5 V power supply and −5 V DC ADJ control on −5 V power supply fully counterclockwise.

2. Turn POWER DISCONNECT 50/60 HZ switch to ON position. Blower should operate.

3. Turn POWER DISCONNECT 400 HZ circuit breaker to ON position. POWER ON indicator on front panel should light.

4. Set METER SELECTOR switch on +5 V power supply to +5 V position. Turn VOLTAGE ADJUST control until percent meter indicates 0 percent.

5. Set METER SELECTOR switch to −5 V position. Turn −5 V DC ADJ control until percent meter indicates 0 percent.

6. Place A-OPTION, NORMAL, B-OPTION switch on maintenance board to NORMAL position.

7. Press MASTER CLEAR pushbutton on logic module A04. Coupler executes its internal diagnostic and displays test results in 16-LED memory display on maintenance board.

   NOTE

   A hexadecimal code indicating successful test completion or a test error is displayed in the 16-LED memory display. Code 8800_{16} indicates successful test completion. (Only if no LEDs remain lit on PC boards. Observe LED indicators on logic modules A04, A07, and A12 to verify successful test operation.) Refer to section 2 for LED indicator descriptions, and refer to section 6 for internal diagnostic test descriptions. Use SAM 3 in section 7 to troubleshoot any internal diagnostic errors.

8. Run coupler down-line diagnostic tests from the PP. Refer to section 6 for a description of down-line diagnostic tests and for information on how to execute them using either MALET or DEMOT. Refer to appropriate SAM in section 7 to troubleshoot any down-line diagnostic errors.

9. Load applicable subsystem operating microcode into coupler RAM. Refer to section 2 for autoload information.

CYBER Channel Clock Tuning Verification Procedure

Clock tuning is performed at the factory prior to shipment and should not be performed in the field. This procedure is provided only to verify that the tuning is correct. If a clock tuning problem exists, return the module to the factory for replacement. This verification procedure applies to both the A01 module contained in the FR205-B coupler and the A15 module contained in the FV720-B coupler.

1. Turn coupler power off by placing 400-HZ POWER DISCONNECT switch on power distribution box A7 to OFF position.
2. Connect CYBER channel I/O cables if not already installed.
3. Place logic module A01 of FR205 (or A15 of FV720) coupler on card extender.
4. Turn coupler power on by placing 400-HZ POWER DISCONNECT switch on power distribution box A7 to ON position.
5. Use the following steps to verify accuracy of 10-MHz clock, oscilloscope, and probes.
    a. Synchronize TP34 using channel A of oscilloscope. There should be 100 ±2 ns from leading edge of one pulse to leading edge of next pulse.
    b. Compare channel B with channel A; they should be the same.
6. Check 40-MHz clock circuit as follows.
    a. Ground TP34 or 4017-13.
    b. Synchronize TP36. The leading edge of pulses should be 90 ±2 ns apart.
    c. Remove ground installed in step 6a.
    d. Pulses at TP36 should be 100 ±2 ns apart.
7. Check T75D pulse relationship with T75 pulse as follows.
    a. Synchronize TP36 (T75) using channel A of oscilloscope.
    b. Connect channel B to TP30 (T75D). The leading edge of pulse at TP30 should lag leading edge of pulse at TP36 by 15 ±2 ns.
8. Turn coupler power off (400-HZ POWER DISCONNECT switch on power distribution box A7 to OFF position) and reinstall logic module in chassis.
9. Turn coupler power on (400-HZ POWER DISCONNECT switch on power distribution box A7 to ON position) and reload subsystem microcode in coupler. Refer to section 2 for autoload information if needed.

FV720-B Option Installation Procedure

Perform the following steps to install the FV720-B coupler option.

1. Turn coupler power off by placing 400-HZ POWER DISCONNECT switch to OFF.
2. Refer to chassis map in section 5 for correct card placement, and install logic modules in logic chassis.
3. Connect two I/O cables (CDC 19191600) between FV720-B coupler INPUT and OUPUT connectors and PP. Refer to figure 3-2 for coupler I/O connector locations.
4. Connect two I/O cables (CDC 774750XX) between FV720-B coupler CHANNEL B BUS and TAG connectors (figure 3-3) and external FIPS device. Be sure to connect quick-disconnect terminals from cable shields to spade lugs mounted next to I/O connectors.
5. Connect EPO cable (CDC 729208XX) between UNIT B connector of coupler (figure 3-2) and EPO connector of external FIPS device.
6. Install two terminator assemblies: CDC 75268900 at BUS connector and CDC 94390700 at TAG connector of last FIPS device.
7. Attach FV720-B Option ID tag to front panel of coupler just to right of FR205-B ID tag.
8. Attach FV720-B FCO log to inside of rear cabinet door next to FR205-B FCO log.
9. Assign an 8-bit HUI to the FV720-B coupler by wiring the appropriate backpanel pins at chassis location A18. Refer to Hardware Unique Identifier Wiring described previously for the wiring procedure for the FR205-B coupler.
10. Apply power to coupler by placing 400-HZ POWER DISCONNECT switch to ON.
11. Place A-OPTION, NORMAL, B-OPTION switch on maintenance board to NORMAL.
12. Press MASTER CLEAR pushbutton on logic module A18 of FV720-B coupler. Coupler executes its internal diagnostic and displays test results in 16-LED memory display on maintenance board.

    NOTE

    A hexadecimal code indicating successful test completion or a test error is displayed in the 16-LED memory display. Code 8800_{16} indicates successful test completion. (Only if no LEDs remain lit on PC boards. Observe LED indicators on logic modules A04, A07, and A12 to verify successful test operation.) Refer to section 2 for LED indicator descriptions, and refer to section 6 for internal diagnostic test descriptions. Use SAM 3 in section 7 to troubleshoot any internal diagnostic errors.

13. Run coupler down-line diagnostic tests from the PP. Refer to section 6 for a description of down-line diagnostic tests and for information on how to execute them using either MALET or DEMOT. Refer to appropriate SAM in section 7 to troubleshoot any down-line diagnostic errors.
14. Load applicable subsystem operating microcode into coupler RAM. Refer to section 2 for autoload information.

Theory of Operation

4

Theory of Operation 4

Refer to the following for information on CYBER Channel Coupler (the coupler) theory of operation.

LOGIC CIRCUIT DESCRIPTIONS

Refer to the text pages in the diagrams section of this manual.

SUBSYSTEM MICROCODE FUNCTIONAL DESCRIPTION

Refer to the applicable subsystem user's guide as listed in About This Manual.

COUPLER MICROCODE FUNCTIONAL DESCRIPTION

Refer to the CYBER Channel Coupler Hardware Reference Manual listed in About This Manual.

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Diagrams

5

This section contains a chassis map, block diagrams, logic diagrams, a power distribution diagram, and a CCC power interface diagram for the CYBER channel coupler (the coupler).

The diagrams for the optional coupler (FV720) are the same as those for the basic coupler (FR205) diagrams except for the location of the logic boards. The basic coupler is contained in locations 01 through 14 of logic row A, and the optional coupler is contained in locations 15 through 27 of logic row A. Refer to the chassis map for specific card locations.

Refer also to the TTL Key to Logic Symbols Customer Engineering Manual listed in About This Manual for a description of the symbology used in the logic diagrams. Conventions used to annotate the logic diagrams are shown in figure 5-1.

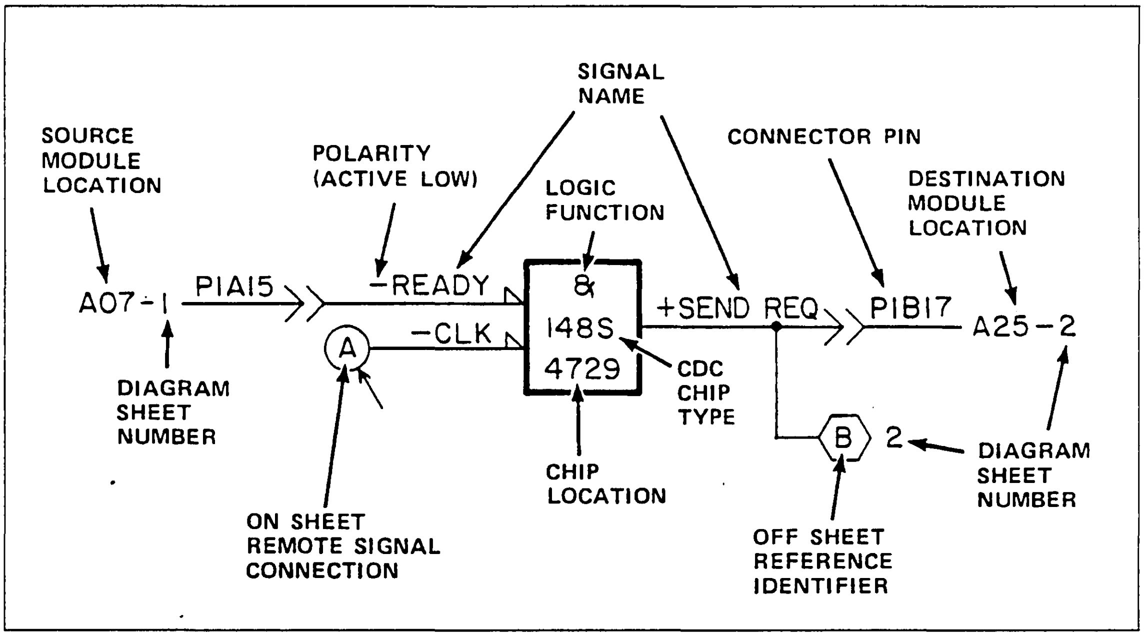


Figure 5-1. Logic Diagram Conventions

CCC Chassis MAP

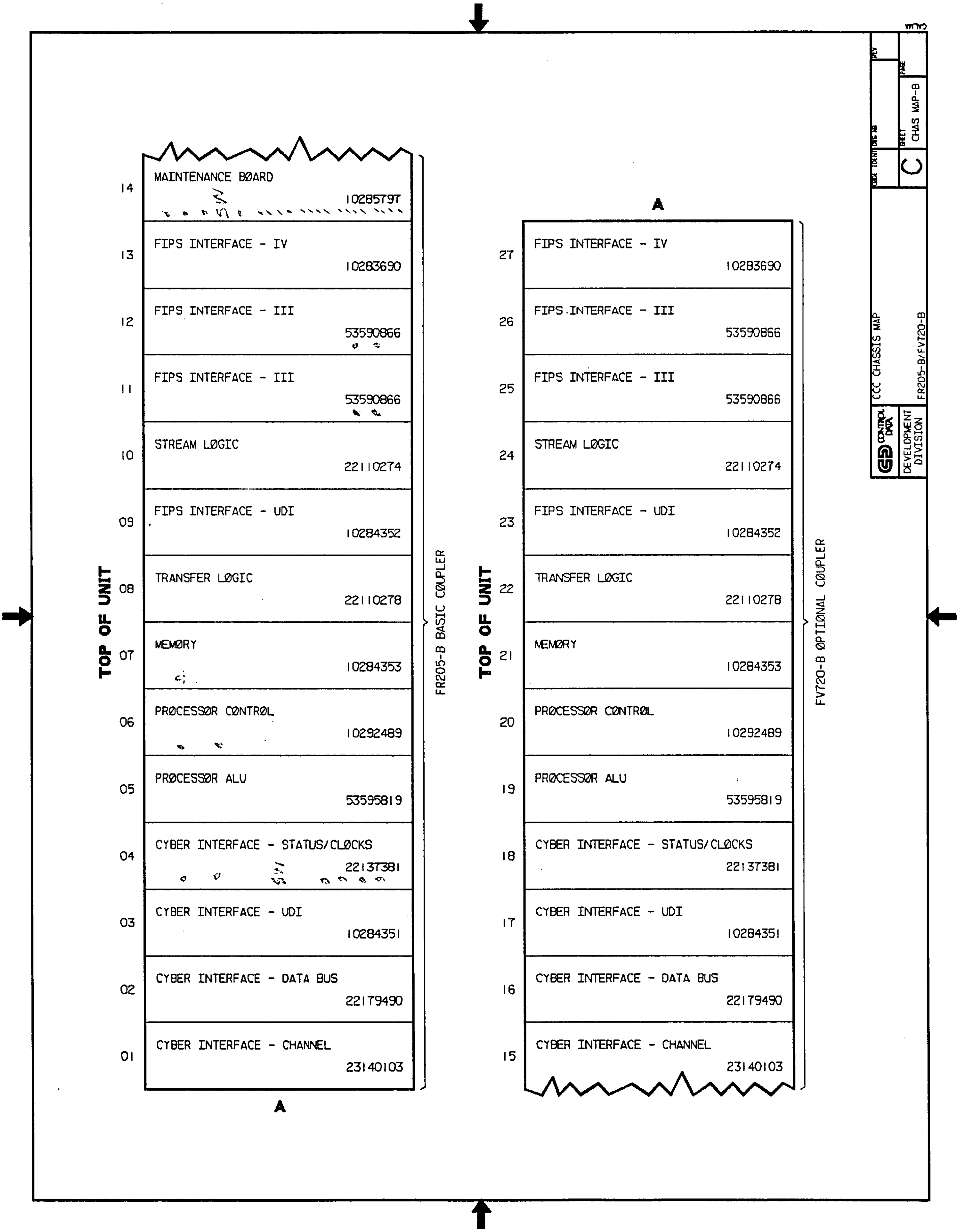
The general data paths for the coupler are shown in diagrams following the chassis map. These include:

- CYBER Interface Read/Write block diagrams
- FIPS Interface Read/Write block diagrams
- Processor and Memory block diagrams

CYBER Interface Block Diagram Write Path

The CYBER Interface block diagram for the write path is shown on the page facing the CCC Chassis Map.

CYBER Interface Block Diagram Write Path

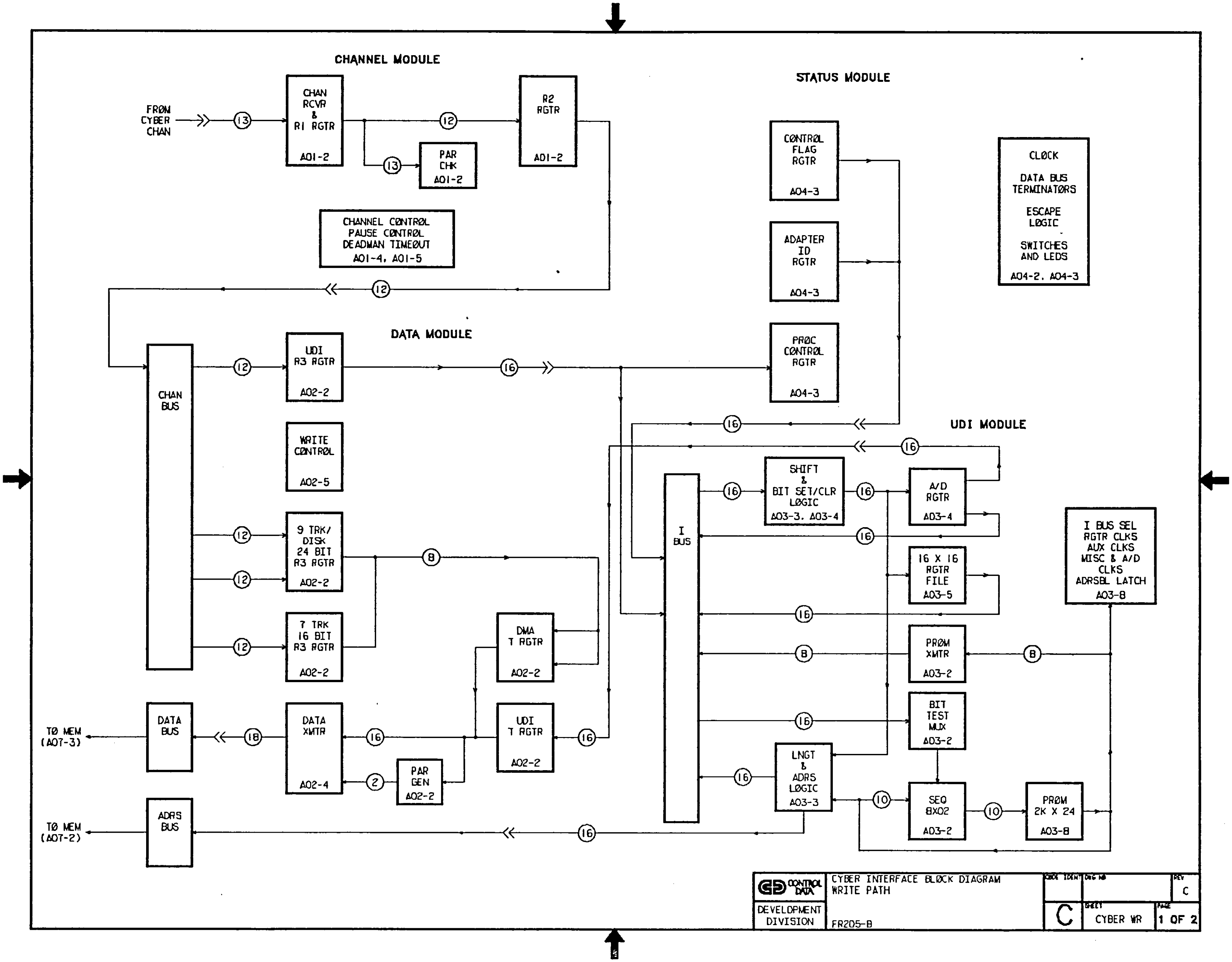


FR205-B BASIC COUPLER

Slot	Board	Part No.
14	MAINTENANCE BOARD	10285797
13	FIPS INTERFACE - IV	10283690
12	FIPS INTERFACE - III	53590866
11	FIPS INTERFACE - III	53590866
10	STREAM LOGIC	22110274
09	FIPS INTERFACE - UDI	10284352
08	TRANSFER LOGIC	22110278
07	MEMORY	10284353
06	PROCESSOR CONTROL	10292489
05	PROCESSOR ALU	53595819
04	CYBER INTERFACE - STATUS/CLOCKS	22137381
03	CYBER INTERFACE - UDI	10284351
02	CYBER INTERFACE - DATA BUS	22179490
01	CYBER INTERFACE - CHANNEL	23140103

FV720-B OPTIONAL COUPLER

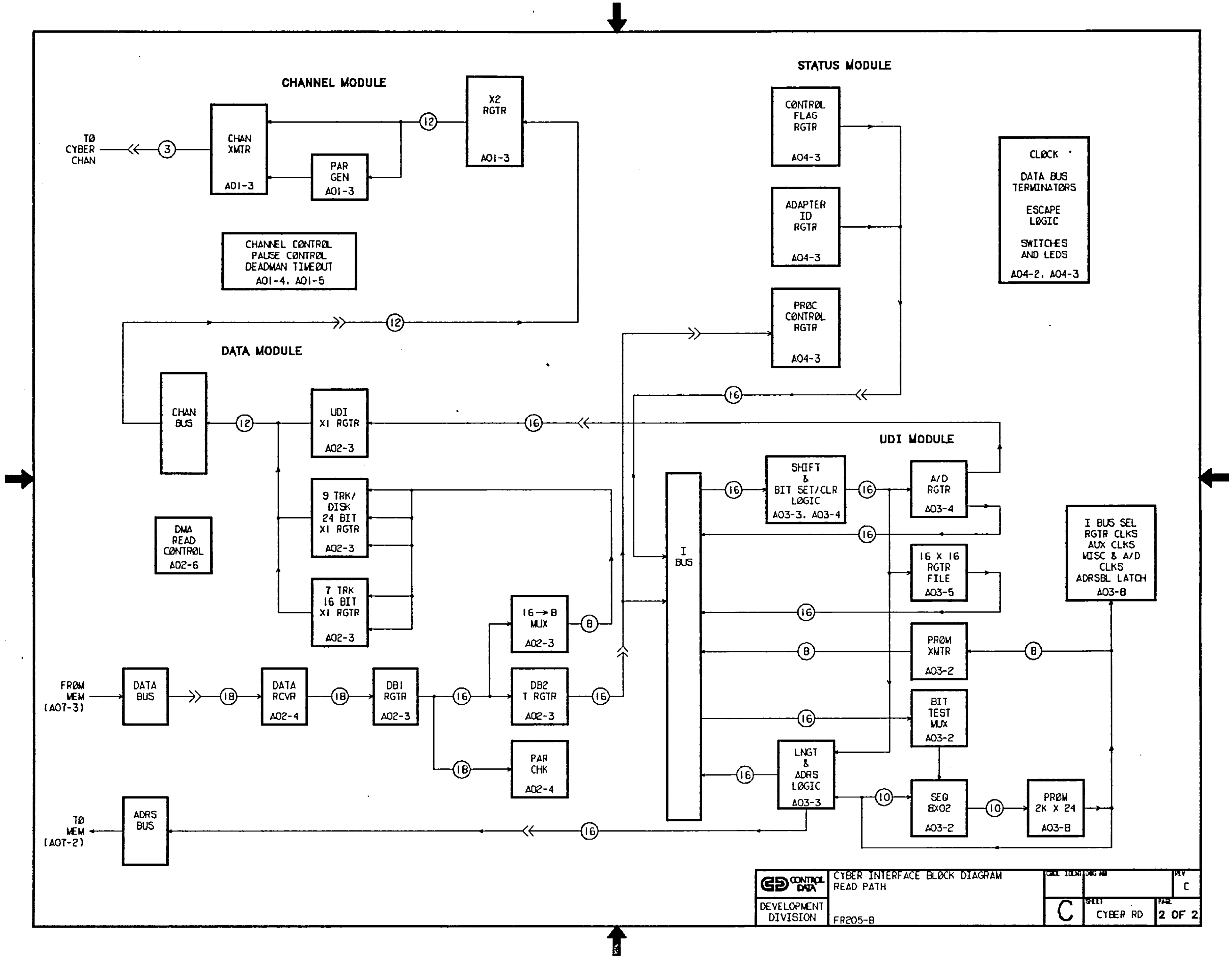
Slot	Board	Part No.
27	FIPS INTERFACE - IV	10283690
26	FIPS INTERFACE - III	53590866
25	FIPS INTERFACE - III	53590866
24	STREAM LOGIC	22110274
23	FIPS INTERFACE - UDI	10284352
22	TRANSFER LOGIC	22110278
21	MEMORY	10284353
20	PROCESSOR CONTROL	10292489
19	PROCESSOR ALU	53595819
18	CYBER INTERFACE - STATUS/CLOCKS	22137381
17	CYBER INTERFACE - UDI	10284351
16	CYBER INTERFACE - DATA BUS	22179490
15	CYBER INTERFACE - CHANNEL	23140103



CYBER Interface Block Diagram Write Path

CYBER Interface Block Diagram Read Path

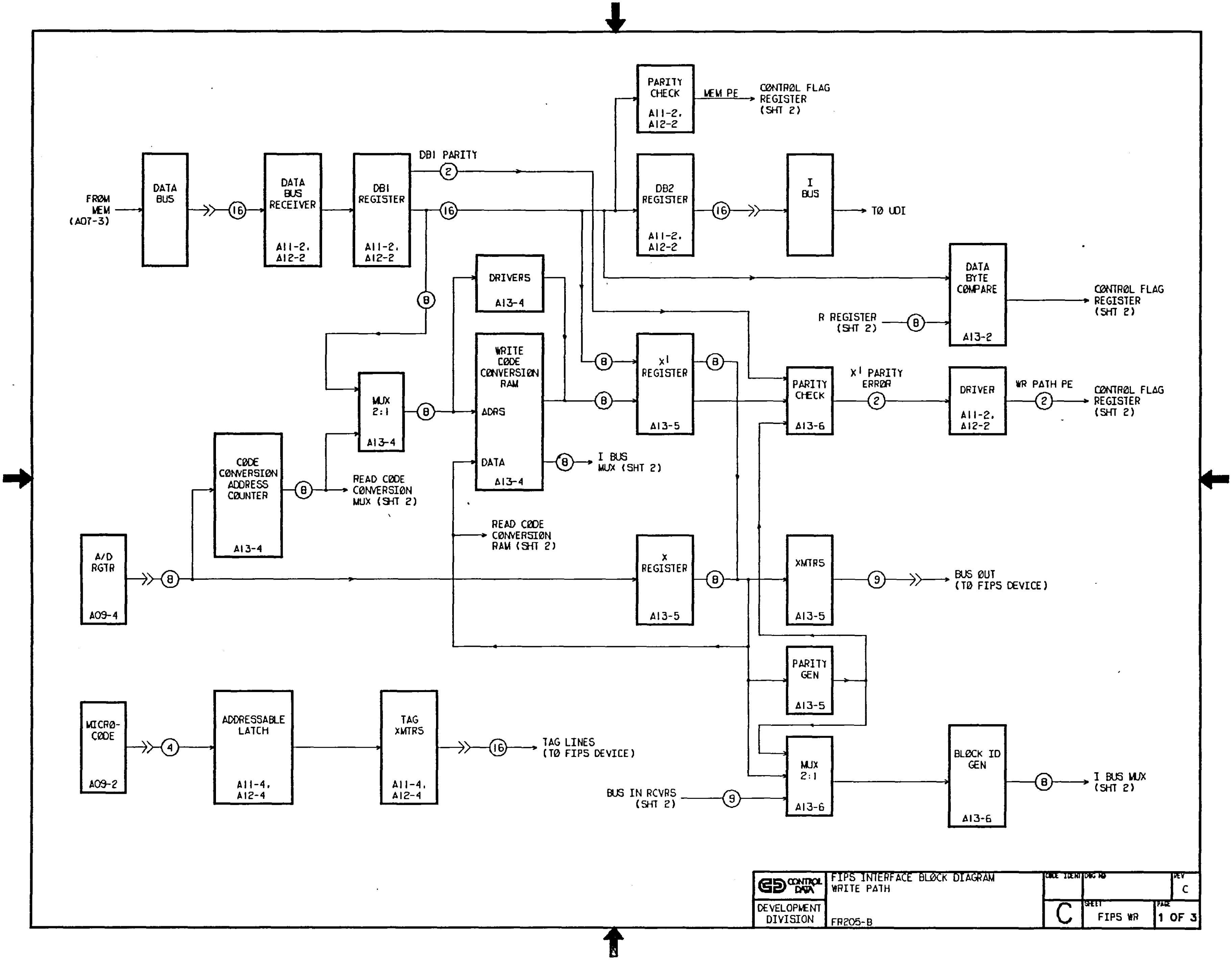
The CYBER Interface Block Diagram Read Path is shown on the facing page.



CYBER Interface Block Diagram Read Path

FIPS Interface Block Diagram Write Path

The FIPS Interface Block Diagram Write Path is shown on the facing page.



CONTROL DATA

DEVELOPMENT DIVISION

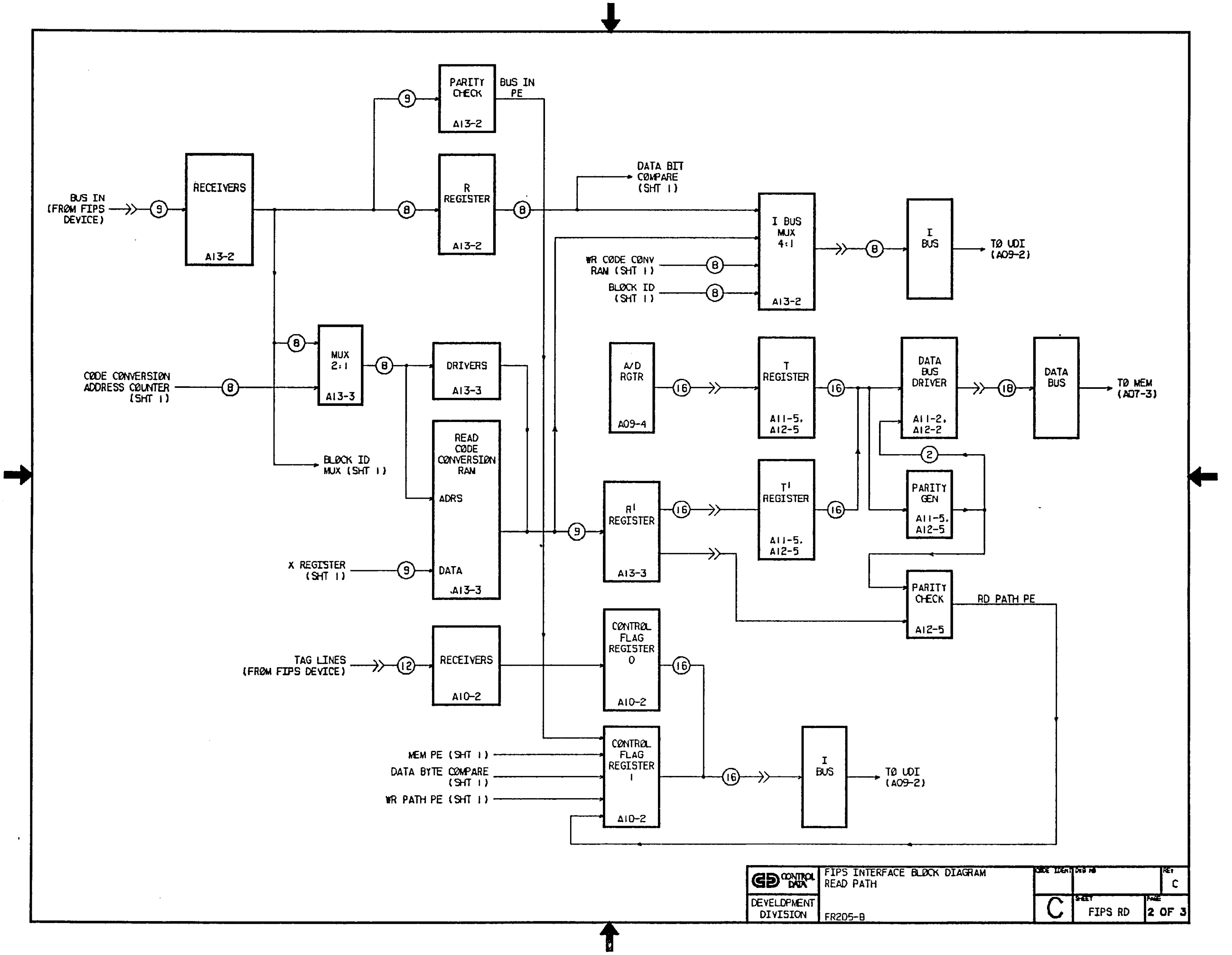
FIPS INTERFACE BLOCK DIAGRAM
WRITE PATH

FR205-B

CODE IDENT	DWG NO	REV
C		C
SHEET	FIPS WR	PAGE 1 OF 3

FIPS Interface Block Diagram Read Path

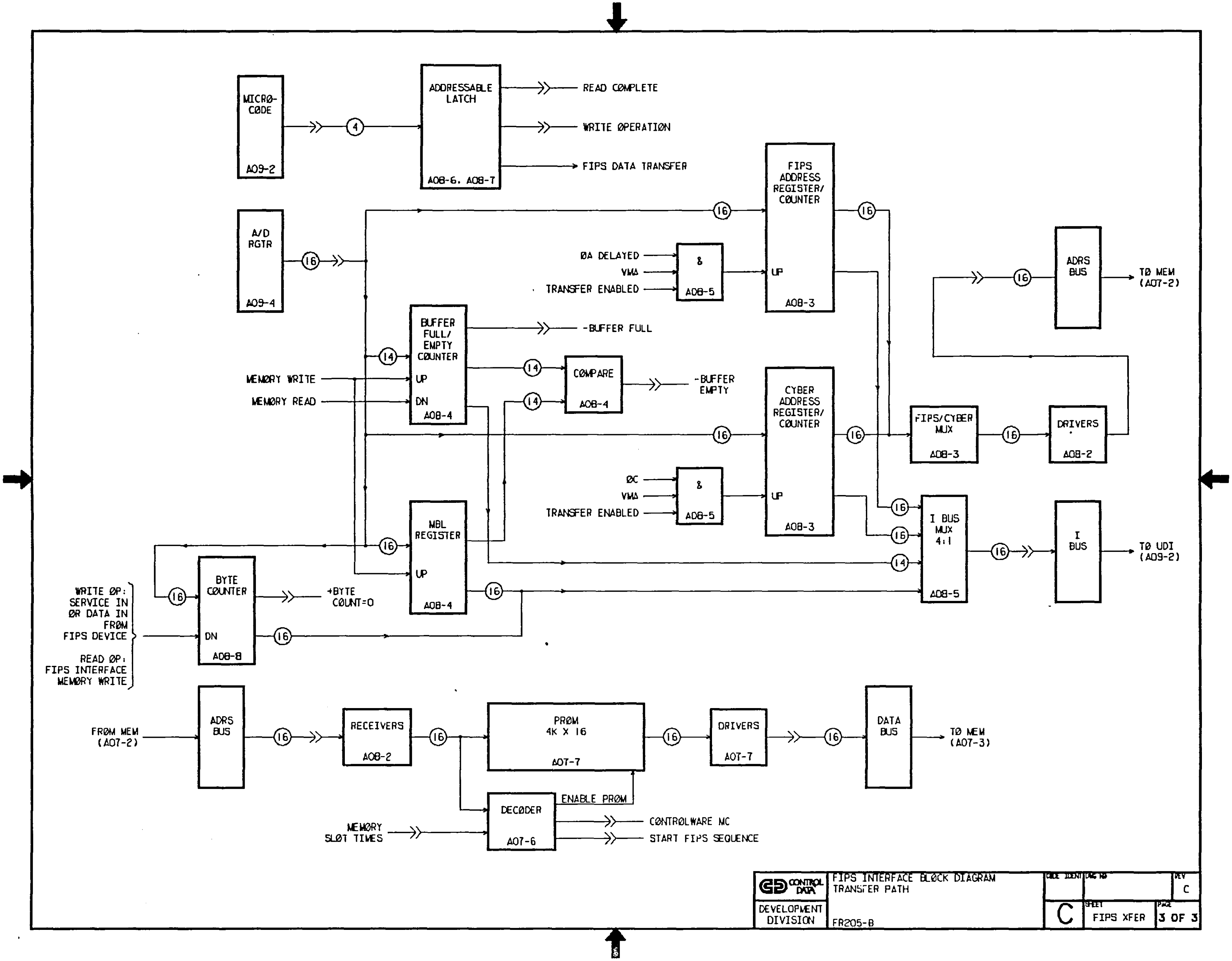
The FIPS Interface Block Diagram Read Path is shown on the facing page.



FIPS Interface Block Diagram Read Path

FIPS Interface Block Diagram Transfer Path

The FIPS Interface Block Diagram Transfer Path is shown on the facing page.

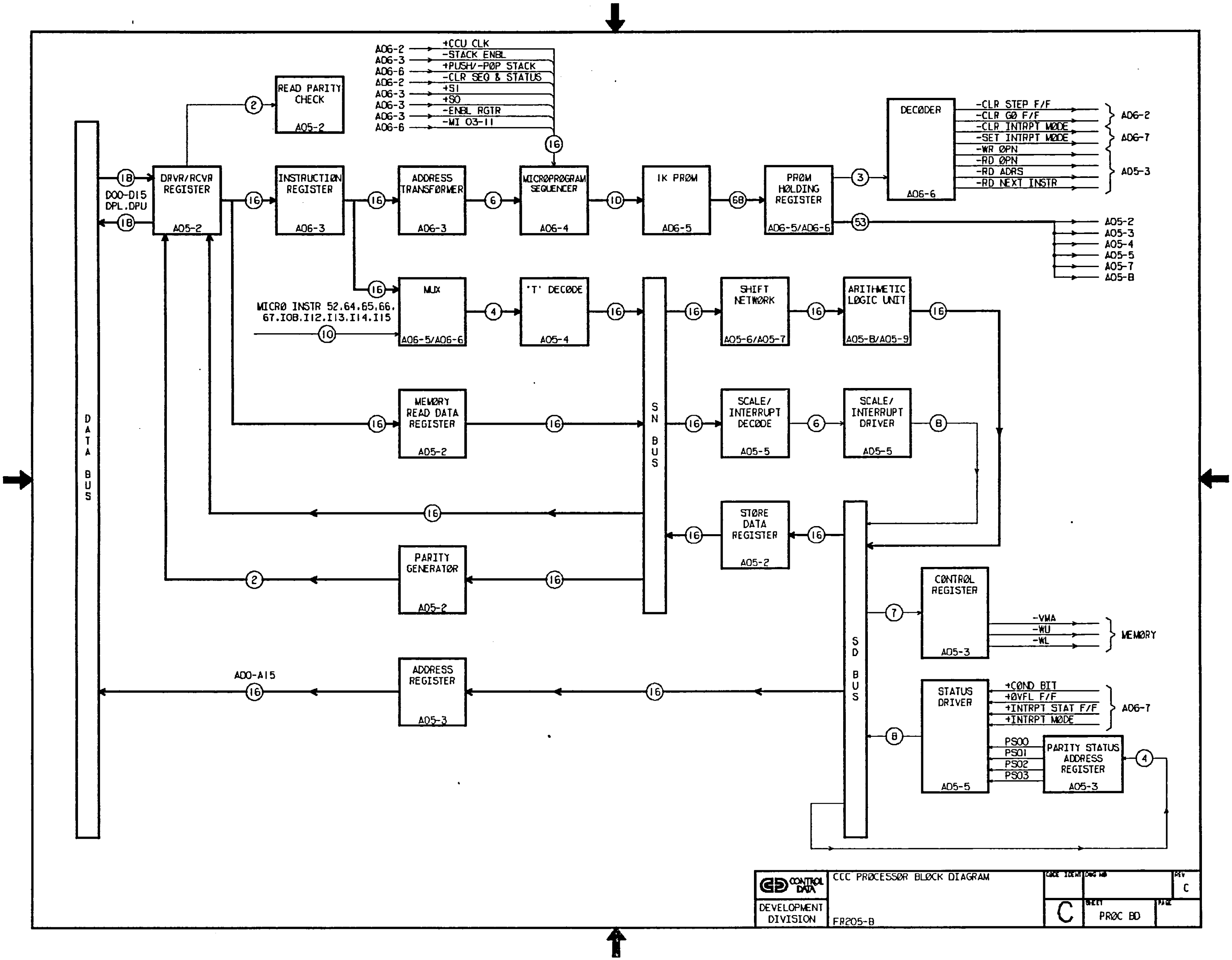


FIPS Interface Block Diagram Transfer Path

CCC Processor Block Diagram

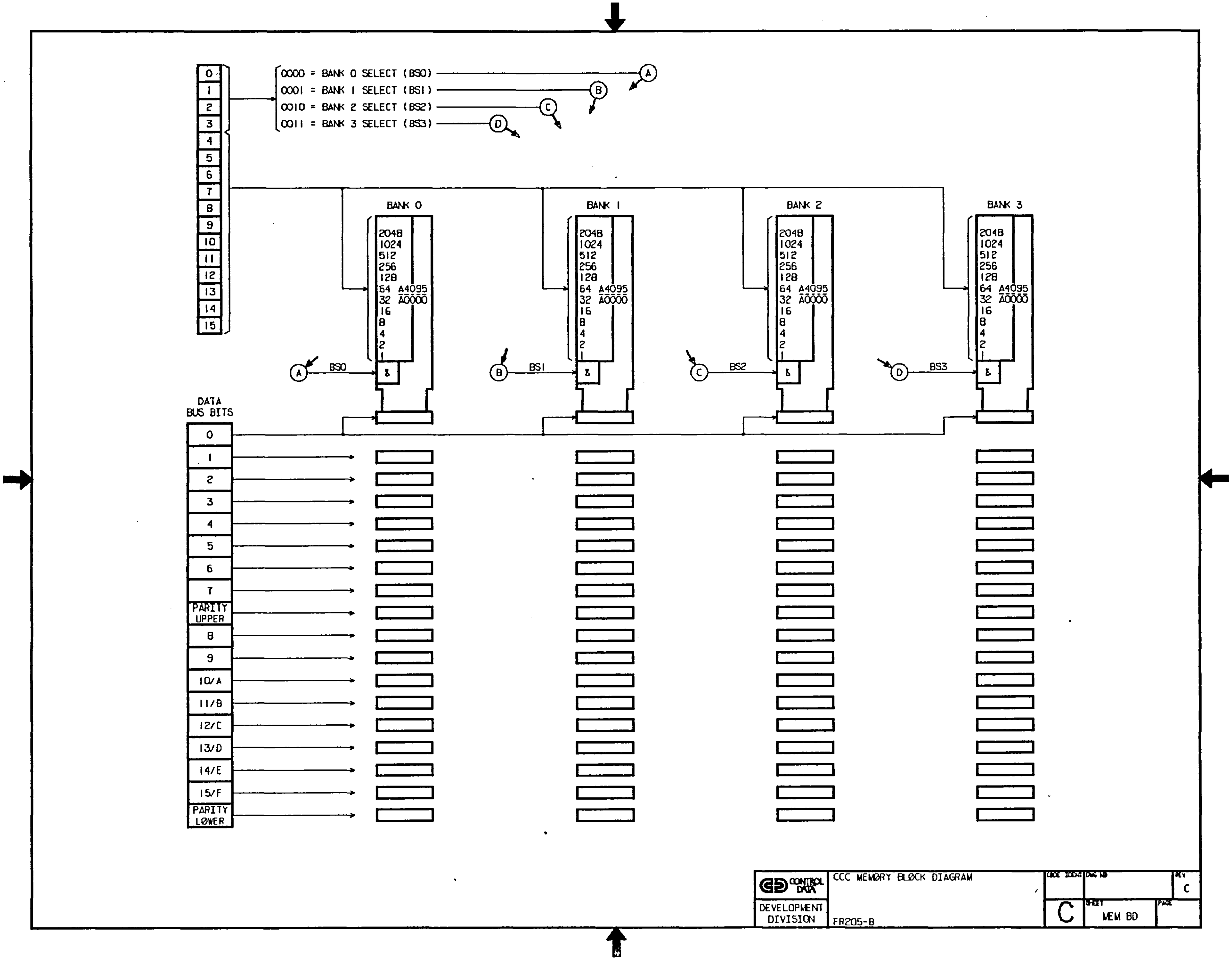
The CCC Processor Block Diagram is shown on the facing page.

CCC Processor Block Diagram



CCC Memory Block Diagram

The CCC Memory Block Diagram is shown on the facing page.


0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
0000 = BANK 0 SELECT (BS0)
0001 = BANK 1 SELECT (BS1)
0010 = BANK 2 SELECT (BS2)
0011 = BANK 3 SELECT (BS3)
A
B
C
D
BANK 0
BANK 1
BANK 2
BANK 3
2048
1024
512
256
128
64
32
16
8
4
2
1
A4095
A0000
BS0
BS1
BS2
BS3
&
DATA BUS BITS
PARITY UPPER
10/A
11/B
12/C
13/D
14/E
15/F
PARITY LOWER
CONTROL DATA
DEVELOPMENT DIVISION
CCC MEMORY BLOCK DIAGRAM
FR205-B
C
MEM BD
REV C

CYBER Channel I/F (A01)

The revision levels for the logic diagrams for the CYBER Channel I/F are noted on the facing page.

PAGE						REVISION RECORD					
6	5	4	3	2	1	ECO	DESCRIPTION	DRFT	DATE	CHKD	APVD
A	A	A	A	A	A		CLASS A RELEASED	MES	01/85	NZ	LU
B	B	B	B	B	B	CA48239	ADDED COVER, RE-INTERSHEET	MES	1/21/87	NS	NS
C	B	B	B	B	C	CA48667	INCREASED TW/PR TO 63 IN., PAGE 6	MES	3/12/87	NS	NS
C	B	B	B	B	D	CA48908	NEW PWB NUMBER	KMS	5/12/87	NS	NS

NOTES:

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2. UPDATES TO LOGIC PRINTS MUST BE PERFORMED BY CALMA.
3. THE OFF SHEET SIGNAL REFERENCES DESIGNATE THE PAGE IN THE TITLE BLOCK AREA ON DIAGRAMS.

DETACHED LISTS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN
TOLERANCES
PLACE ± PLACE ± ANGLES ±
MATERIAL
FINISH

DWN	M E SCHMIDT	01/85
CHKD	N ZAK	01/85
ENGR	L.B. ULFIG	07/85
MFG	J. NOES	07/85
APVD	L.B. ULFIG	07/85

EQUIP. NO. FR205-B

THIRD ANGLE PROJECTION

CONTROL DATA

ARDEN HILLS OPERATIONS
ST. PAUL, MINN.

TITLE

LOGIC DIAGRAM
CYBER CHANNEL I/F

PWA-23140103
PWB-23140104

SIZE C FSCM NO. 34010 DWG NO. 23140105

A01 SHEET I/F 1 PAGE 1 OF 6

CYBER Interface - Channel (A01-2)

R1 Register

This register receives 12 data bits (Out 00 through Out 11) and an associated parity bit (Out Par) from the CYBER I/F channel during a write operation. The R1 register routes the data bits (R00 through R11) to a parity checker and the R2 register.

Parity Checker

The output parity bit (Out Par) from the CYBER I/F channel is compared with the parity bit from the parity generator. If the two bits do not compare, the channel parity error (Chan PE) FF sets and a Chan PE signal is sent to the control flag register (A04-3).

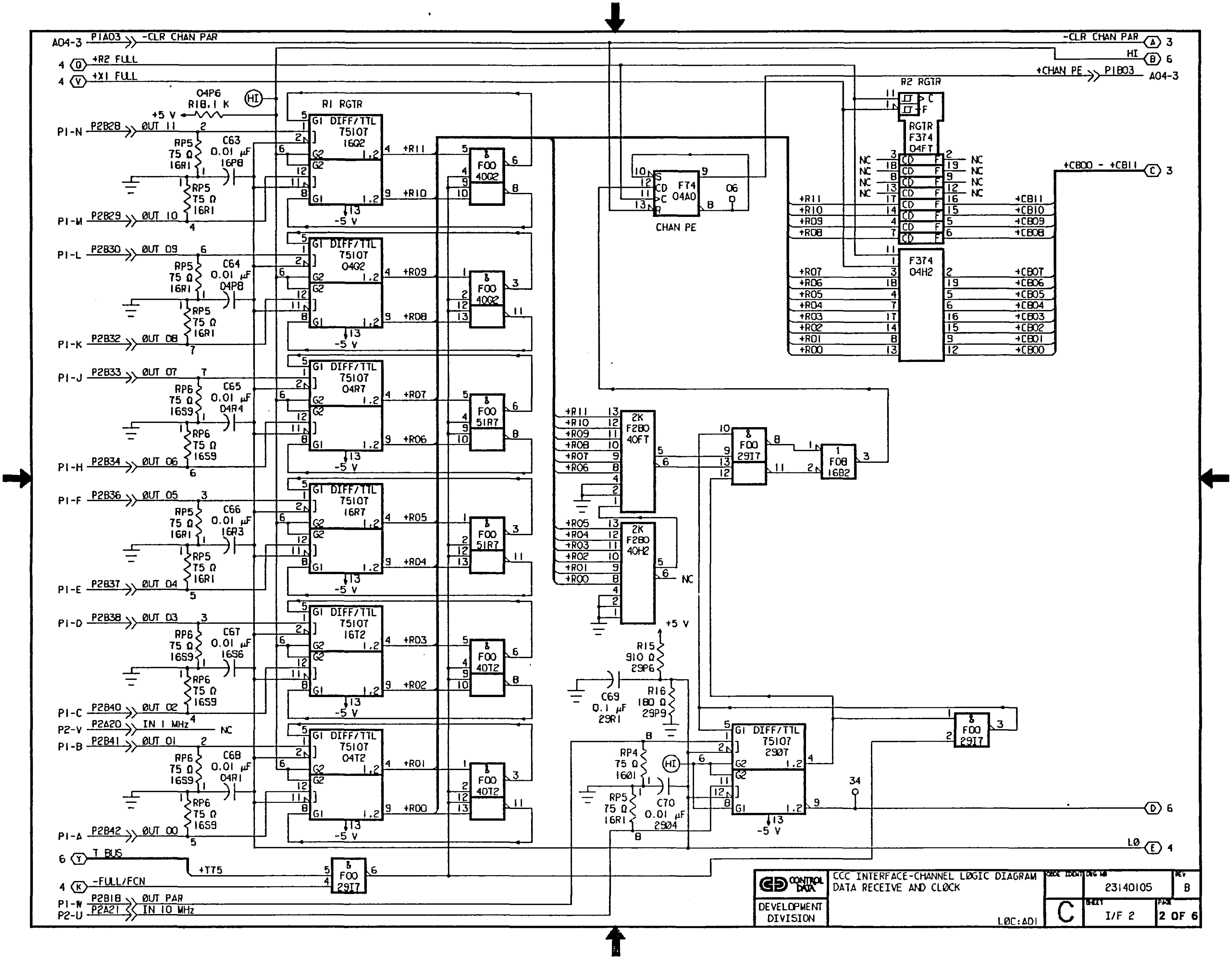
R2 Register

During a write operation, data bits R00 through R11 are held in this register and then placed onto the channel bus (A01-3) as data bits CB00 through CB11.

During a read operation, the X1 full signal (A01-4) tri-states the R2 register (A01-2) to place it in an off condition. This allows the read data from A02-3 to be placed onto the channel bus.

IN 10 MHz Clock

This channel clock signal is used to generate a 40-MHz clock and the T00, T25, T50, and T75 timing signals required for data control (A01-4).



CONTROL DATA

DEVELOPMENT DIVISION

CCC INTERFACE-CHANNEL LOGIC DIAGRAM
DATA RECEIVE AND CLOCK

LOC:AD1

CODE IDENT	DWG NO	REV
C	23140105	B
SHEET	I/F 2	PAGE 2 OF 6

CYBER Interface - Channel (A01-3)

X2 Register

This register receives the 12 data bits of the channel word (CB00 through CB11) from the channel bus during a read operation. The X2 register routes the data bits (0 through 11) to a parity generator and to associated driver circuits.

Driver

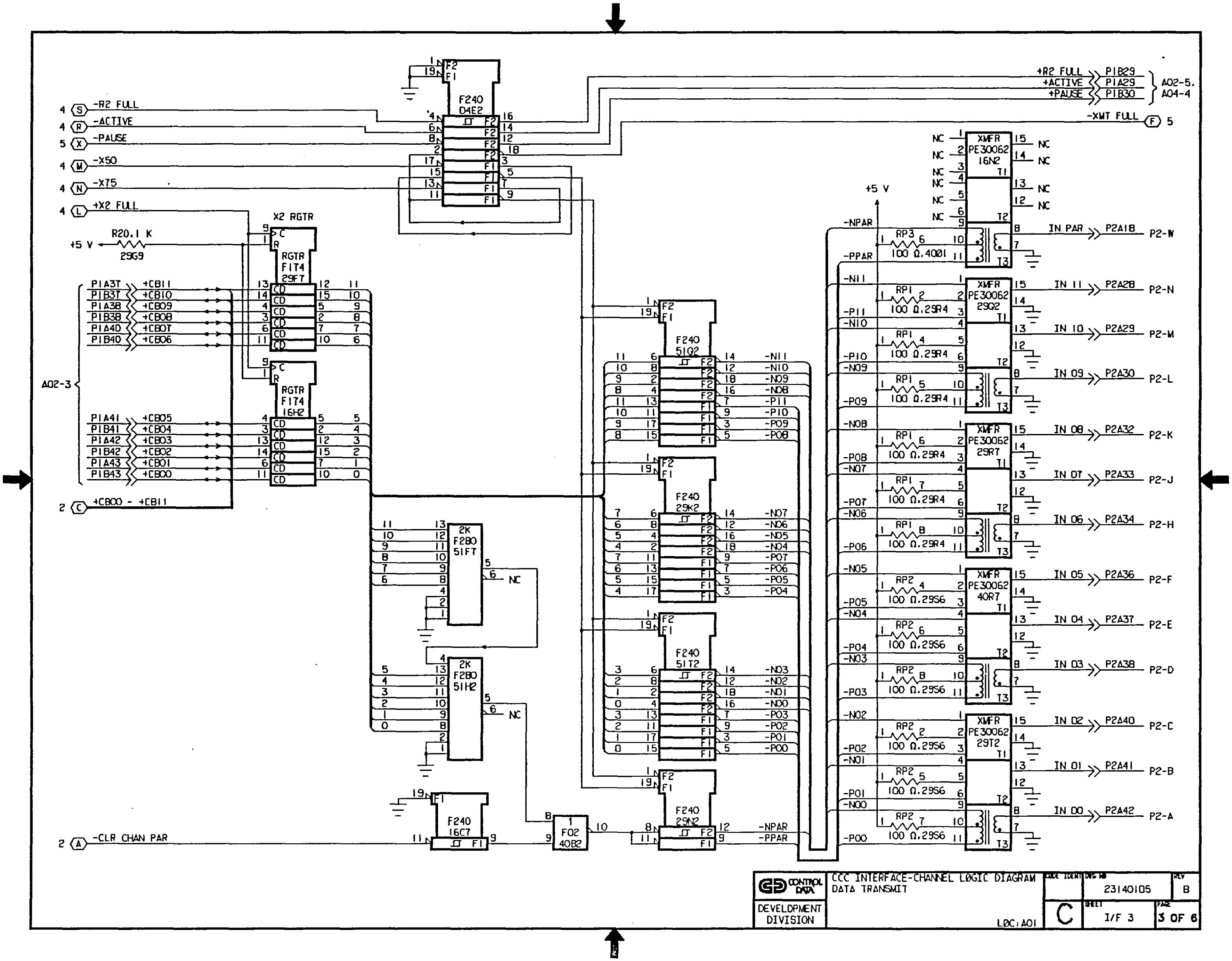
The driver circuits transmit the 12-bit channel words from the X2 register to the CYBER I/F channel. The X75 and X50 timing signals clock the positive-going half of the data bits (P00 through P11) and the negative-going half of the data bits (N00 through N11) through the driver and transformers, respectively.

Parity Generator

A parity bit is generated from the 12 channel bus data bits received from the X2 register. The parity bit (N Par or P Par) is gated through the driver circuit along with the data bits and is sent to the channel transmitters.

Channel Transmitters

These transmitters send the 12 data bits and associated parity bit to the CYBER I/F channel.



CD CONTROL DATA

DEVELOPMENT DIVISION

CCC INTERFACE-CHANNEL LOGIC DIAGRAM
DATA TRANSMIT

LOC: A01

CODE IDENT | DWG NO 23140105 | REV B

C | SHEET I/F 3 | PAGE 3 OF 6

CYBER Interface - Channel (A01-4)

Channel Output Control Signals

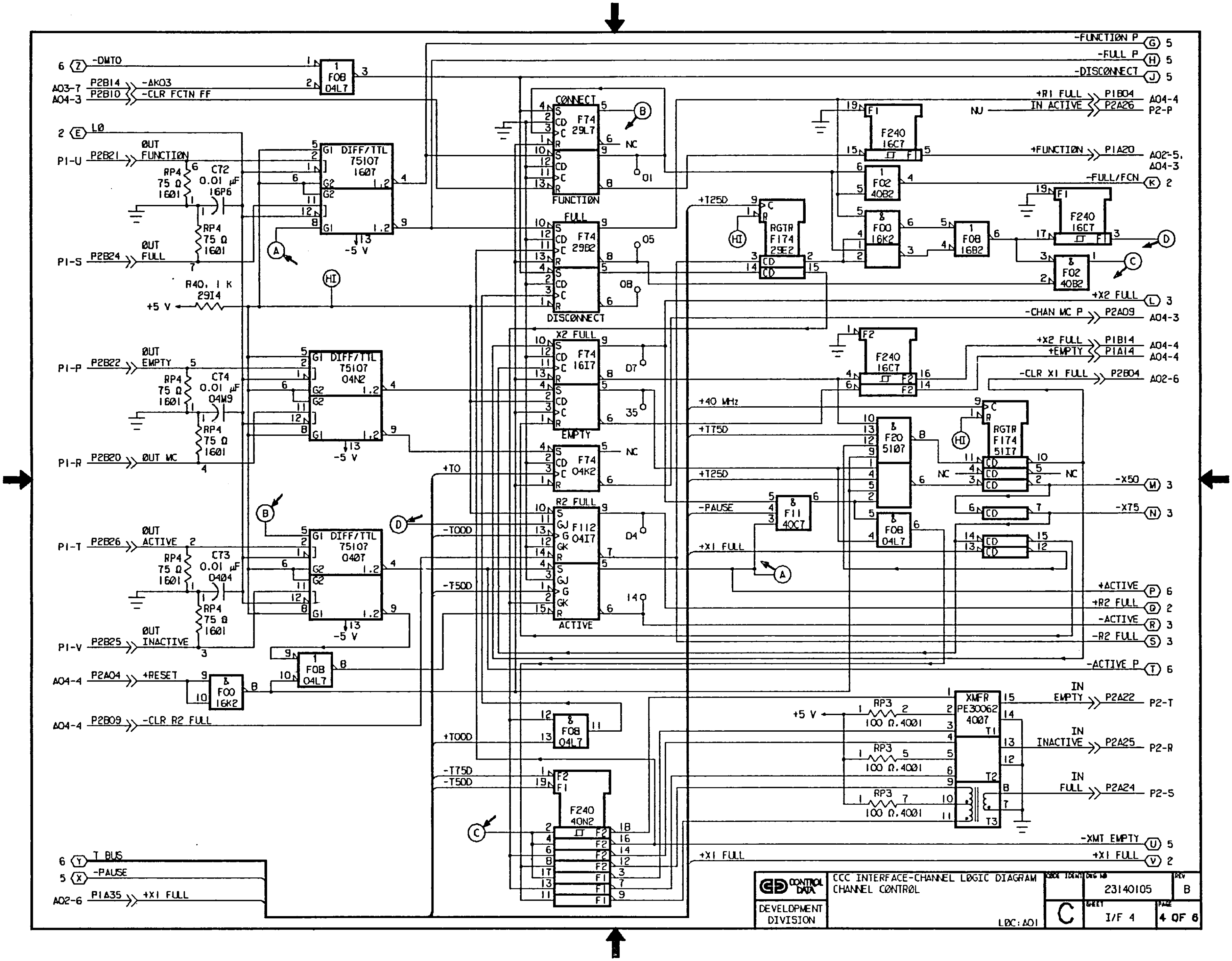
Differential receivers receive the Out Function, Out Full, Out Active, Out Inactive, Out Empty, and Out MC (Master Clear) signals from the CYBER channel I/F. These signals set corresponding FFs except for the Out Inactive signal. The FF outputs are sent to the status circuits (A04-4) except for the Out MC signal which is sent to A04-3. The Out Inactive signal is used to clear the active FF.

Connect/Disconnect

The connect and disconnect FFs are set by a deadman timeout (DMTO) signal (A01-5) or a disconnect channel signal (AK03) from the CYBER channel I/F universal device interface (UDI) (A03-7). The disconnect FF clocks the active FF and gates the In Inactive signal through its transmitter to the CYBER I/F channel. The In Empty and In Full control signals are also sent to the CYBER channel I/F.

X2 Full/R2 Full

The X2 full and R2 full FFs control the data transfers during read and write operations, respectively.


6 Z -DMTO
A03-7 P2B14 -AK03
A04-3 P2B10 -CLR FCTN FF
1 F08 04L7
2 E L0
P1-U P2B21 OUT FUNCTION
RP4 75 Ω 1601
C72 0.01 µF 16P6
P1-S P2B24 OUT FULL
GI DIFF/TTL 75107 1607
-5 V
R40, 1 K 2914
+5 V
HI
A
P1-P P2B22 OUT EMPTY
C74 0.01 µF 04M9
GI DIFF/TTL 75107 04N2
P1-R P2B20 OUT MC
B
P1-T P2B26 OUT ACTIVE
C73 0.01 µF 0404
GI DIFF/TTL 75107 040T
P1-V P2B25 OUT INACTIVE
A04-4 P2A04 +RESET
& F00 16K2
1 F08 04L7
A04-4 P2B09 -CLR R2 FULL
6 Y T BUS
5 X -PAUSE
A02-6 P1A35 +X1 FULL
CONNECT F74 29L7
FUNCTION
FULL F74 29B2
DISCONNECT
X2 FULL F74 16I7
EMPTY
F74 04K2
R2 FULL F112 04I7
ACTIVE
NC 01 05 08 D7 35 D4 14
+TO -T00D -T50D +T00D -T75D -T50D
D
C
& F08 04L7
F240 40N2
+T25D
RGTR F174 29E2
F240 16C7
F02 40B2
& F00 16K2
1 F08 16B2
F240 16C7
& F02 40B2
-FUNCTION P G 5
-FULL P H 5
-DISCONNECT J 5
+R1 FULL P1B04 A04-4
NU IN ACTIVE P2A26 P2-P
+FUNCTION P1A20 A02-5, A04-3
-FULL/FCN K 2
+X2 FULL L 3
-CHAN MC P P2A09 A04-3
F240 16C7
+X2 FULL P1B14 A04-4
+EMPTY P1A14 A04-4
-CLR X1 FULL P2B04 A02-6
+40 MHz
+T75D
+T25D
-PAUSE
+X1 FULL
& F20 5107
& F11 40C7
& F08 04L7
RGTR F174 51I7
NC
-X50 M 3
-X75 N 3
+ACTIVE P 6
+R2 FULL Q 2
-ACTIVE R 3
-R2 FULL S 3
-ACTIVE P T 6
XMFR PE30062 4007
T1 T2 T3
+5 V
RP3 100 Ω, 4001
IN EMPTY P2A22 P2-T
IN INACTIVE P2A25 P2-R
IN FULL P2A24 P2-S
-XMT EMPTY U 5
+X1 FULL V 2
CONTROL DATA
DEVELOPMENT DIVISION
CCC INTERFACE-CHANNEL LOGIC DIAGRAM
CHANNEL CONTROL
LOC: A01
C
23140105
B
I/F 4
4 OF 6

CYBER Interface - Channel (A01-5)

Pause

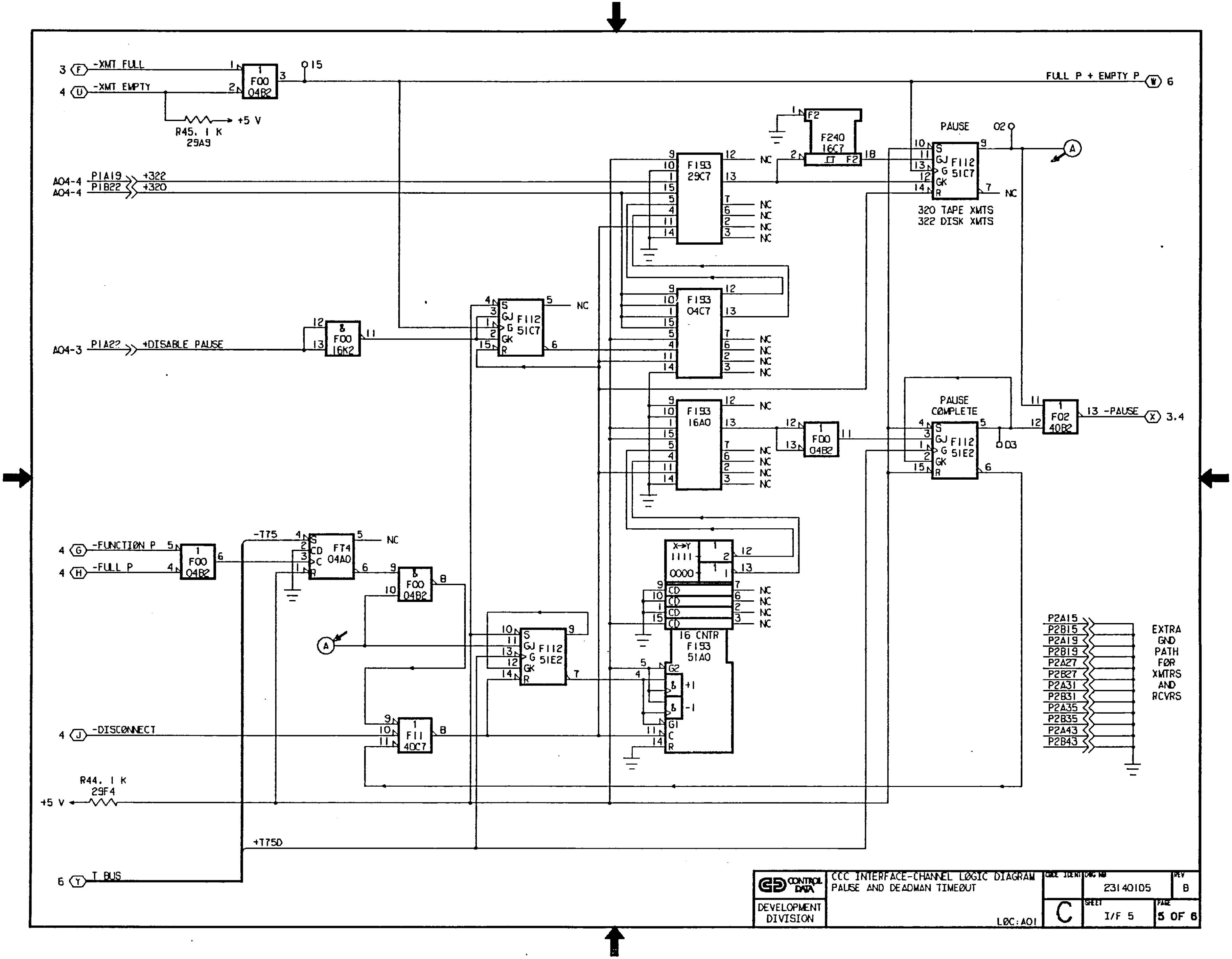
During a write operation, the pause FF sets when the CYBER channel I/F sends each group of 320 12-bit tape words. The pause FF clears in 10 ±1 s (pause complete) or when the next Out Full signal (A01-4), or Out Function signal (A01-4) is sent by the CYBER channel I/F. Termination of the write operation is indicated when the pause FF is clear and the channel is inactive. This allows two peripheral processors to perform a chained write operation.

During a read operation, the CYBER interface pauses for 10 ±1 s after sending each group of 320 12-bit tape words to the CYBER channel. This allows two peripheral processors to perform a chained read operation.

The pause FF also sets after the CYBER channel interface sends 322 12-bit disk words to the CYBER channel. The resulting Pause signal (A01-4) is sent to the status circuits (A04-4) where a Direct Memory Access (DMA) Complete signal is generated. This allows the microcode to disconnect the channel which, in turn, clears the pause FF.

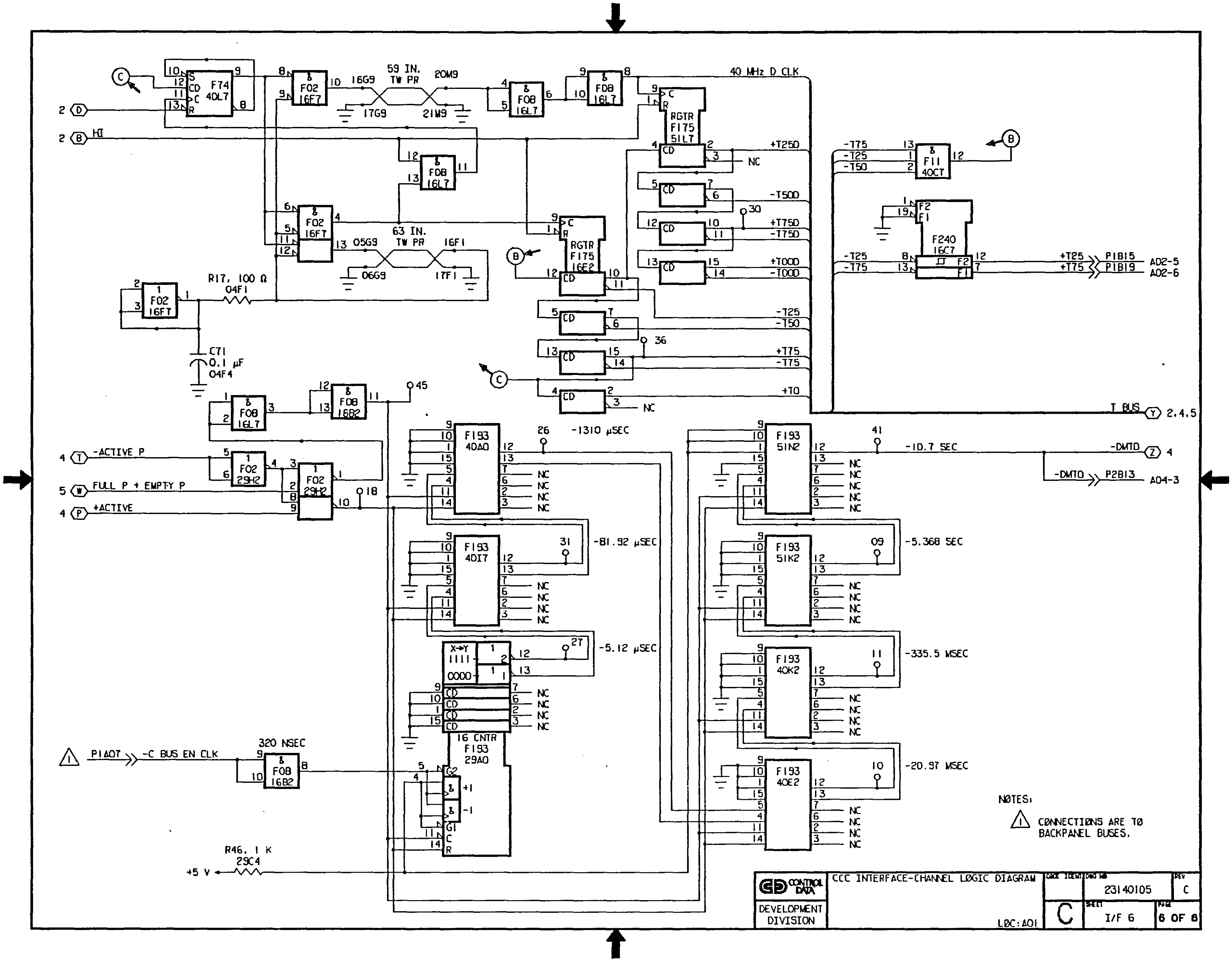
Deadman Timeout

This circuit monitors an active channel for a hung condition during a read or write operation. If the channel does not transfer a word for 8.5 ±1.5 s, the CYBER interface deactivates the channel (A01-4) and sets the deadman timeout FF (A04-3).


3 F -XMT FULL
4 U -XMT EMPTY
F00 04B2
15
R45, 1 K 29A9
+5 V
FULL P + EMPTY P
W 6
A04-4 P1A19 +322
A04-4 P1B22 +320
F153 29C7
F240 16C7
F2
NC
PAUSE
02
F112 51C7
A
320 TAPE XMTS
322 DISK XMTS
F153 04C7
A04-3 P1A22 +DISABLE PAUSE
F00 16K2
F112 51C7
F153 16A0
F00 04B2
PAUSE COMPLETE
F112 51E2
D3
F02 40B2
13 -PAUSE
X 3.4
4 G -FUNCTION P
4 H -FULL P
F00 04B2
-T75
F74 04A0
F00 04B2
A
F112 51E2
X→Y
1111
0000
CD
16 CNTR F153 51A0
G2
+1
-1
G1
4 J -DISCONNECT
F11 40C7
R44, 1 K 29F4
+5 V
+T75D
6 Y T BUS
P2A15
P2B15
P2A19
P2B19
P2A27
P2B27
P2A31
P2B31
P2A35
P2B35
P2A43
P2B43
EXTRA GND PATH FOR XMTRS AND RCVRS
CONTROL DATA
DEVELOPMENT DIVISION
CCC INTERFACE-CHANNEL LOGIC DIAGRAM
PAUSE AND DEADMAN TIMEOUT
LOC: A01
C
23140105
B
I/F 5
5 OF 6

CYBER Interface – Channel (A01-6)

The CCC Interface-Channel Logic Diagram (location A01-6) is shown on the facing page.



NOTES:

⚠1 CONNECTIONS ARE TO BACKPANEL BUSES.

CYBER Interface – Data (A02)

The revision levels for the data diagrams for CYBER Interface (location A02) are shown on the following page.

UNUSED IC'S

CHIP TYPE	LOCATION	OPEN PINS
F00	52LT	(9,10,8)
F02	28T2	(12,11,13),(2,3,1)
F08	16R7	(12,13,11)

PAGE						REVISION RECORD					
6	5	4	3	2	1	ECO	DESCRIPTION	DRFT	DATE	CHKD	APVD
A	A	A	A	A	A		CLASS A RELEASED	EFA	03/86	NZ	RTH
B	B	B	B	B	B	CA47702	SEE NOTE 4	MES	8/21/86	NS	NS
C	C	C	C	C	C	CA48239	ADDED COVER, RE-INTERSHEET	MES	1/30/87	NS	NS
D	C	C	C	C	D	CA48535	CHANGED F08 TO F00 AT LOC 52L7	MES	2/5/87	NS	NS

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2. UPDATES TO LOGIC PRINTS MUST BE PERFORMED BY CALMA.
3. THE OFF SHEET SIGNAL REFERENCES DESIGNATE THE PAGE IN THE TITLE BLOCK AREA ON DIAGRAMS.
4. ALL CHIP IDENTIFIERS ON PWA-22179490 WERE CHANGED FROM 'S' TO 'F' TYPE CHIPS. EXAMPLE - 'F74' ON PWA-22179490 IS 'S74' ON PWA-53590792.

DETACHED LISTS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN
TOLERANCES
PLACE ± PLACE ± ANGLES ±
MATERIAL
FINISH

DWN	E.F. ARLANDSON	12/85
CHKD	N. ZAK	12/85
ENGR	R.T. HENNING	03/86
MFG	B.J. REILAND	03/86
APVD	R.T. HENNING	03/86

EQUIP. NO. FR205-B

THIRD ANGLE PROJECTION

CONTROL DATA

ARDEN HILLS OPERATIONS
ST. PAUL, MINN.

TITLE
LOGIC DIAGRAM
CYBER DATA BUS I/F

PWA-22179490
PWB-22179491

SIZE C
FSCM NO. 34010
DWG NO. 22179492

A02
SHEET DATA BUS I-F
PAGE 1 OF 6

CYBER Interface - Data (A02-2)

9-Track/Disk and 7-Track R3 Registers

These registers assemble data during 9-track tape/disk and 7-track tape direct memory access (DMA) write operations. The registers receive 12-bit words (bits CB00 through CB11) from the CYBER channel bus.

The 9-track disk R3 register is a 24-bit register that assembles two 12-bit channel words into three 8-bit bytes to form 16-bit coupler memory words.

The 7-track R3 register is a 16-bit register that assembles one 12-bit channel word into two 8-bit bytes to form 16-bit coupler memory words. The upper two bits of the 8-bit bytes are not used (forced to zeros).

Data is gated from the R3 register to the DMA T register in 8-bit bytes. For 8-bit channels, the 8-bit byte is stored simultaneously in both the upper byte (bits 0 through 7) and lower byte (bits 8 through 15) of the DMA T register. Both bytes are sent to the data bus transmitters (A02-4) and written into memory (A07-3), but only the upper byte is used. For 16-bit channels, the 8-bit bytes are assembled a byte at a time beginning with the upper byte of the DMA register. Both bytes are then written into memory and the whole word (16 bits) is used. If an odd number of bytes is to be written, the lower byte of the DMA T register is zero-filled before being transferred to memory and an Odd Byte Write signal (A02-6) is sent to the transfer logic (A08-7).

UDI R3 Register

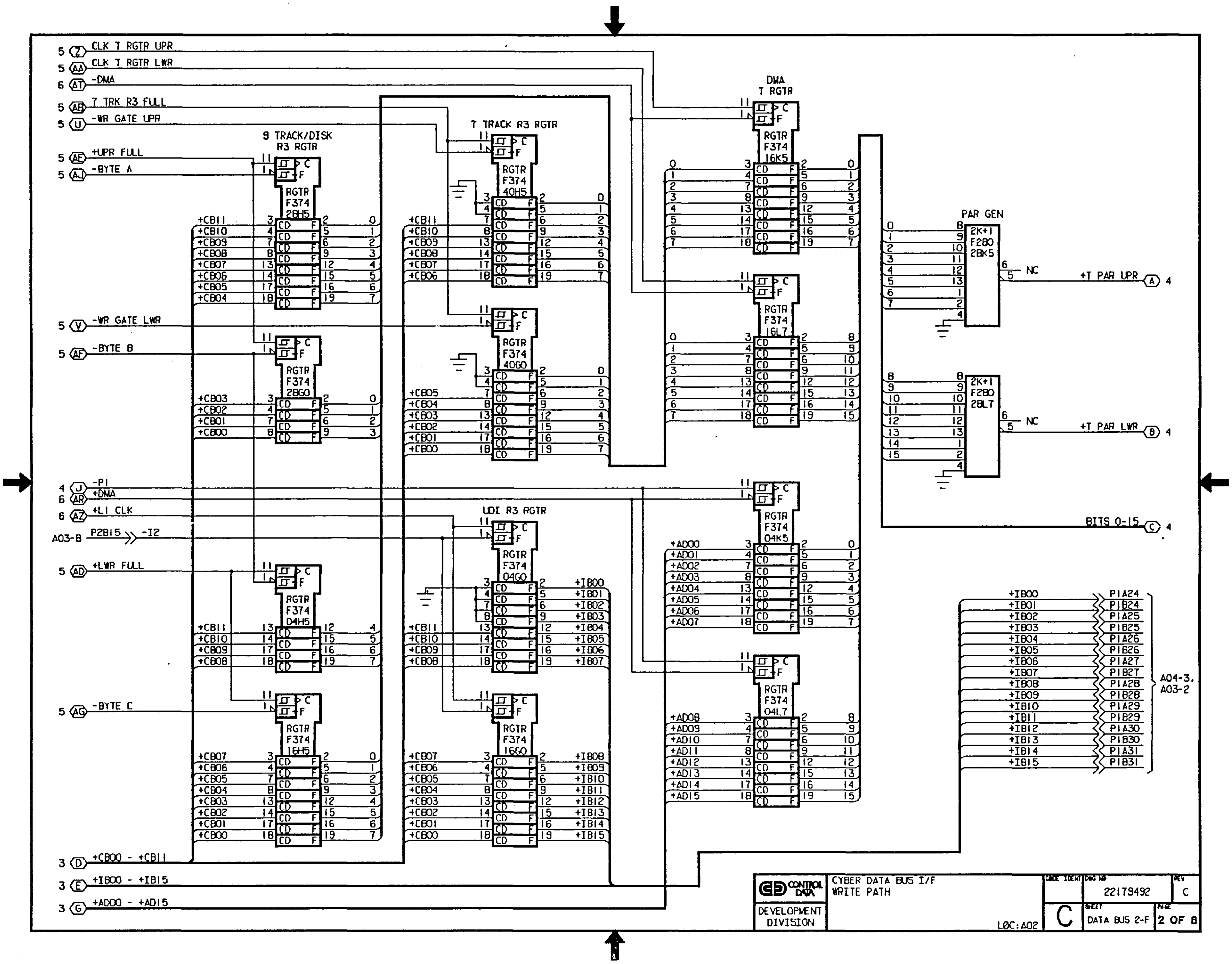
This 16-bit register is used during a UDI write operation. The register receives 12-bit channel words (bits CB00 through CB11) from the CYBER channel bus. The register sends 12-bit channel words (bits IB04 through IB15) to the UDI (A03-2) for assembly into 16-bit coupler memory words. These 16-bit words are routed from the UDI through the UDI T register and data bus transmitters (A02-4) and written into memory (A07-3).

DMA and UDI T Registers

The DMA T register assembles words directly from the 9-track/disk and 7-track R3 registers. The UDI T register receives the assembled words (bits AD00 through AD15) from the UDI (A03-4). The upper and lower 8-bit data bytes are sent to parity generators and to data bus transmitters (A02-4).

Parity Generation

Parity bits are generated (odd parity) for each upper and lower 8-bit data byte sent by the T registers. The parity bits are sent with the data bytes to the data bus transmitters (A02-4).


5 Z CLK T RGTR UPR
5 AA CLK T RGTR LWR
6 AT -DMA
5 AB 7 TRK R3 FULL
5 U -WR GATE UPR
5 AE +UPR FULL
5 AJ -BYTE A
5 V -WR GATE LWR
5 AF -BYTE B
4 J -PI
6 AR +DMA
6 AZ +LI CLK
A03-B P2B15 -I2
5 AD +LWR FULL
5 AG -BYTE C
3 D +CB00 - +CB11
3 E +IB00 - +IB15
3 G +AD00 - +AD15
9 TRACK/DISK R3 RGTR
RGTR F374 28H5
RGTR F374 28G0
RGTR F374 04H5
RGTR F374 16H5
7 TRACK R3 RGTR
RGTR F374 40H5
RGTR F374 40G0
UDI R3 RGTR
RGTR F374 04G0
RGTR F374 16G0
DMA T RGTR
RGTR F374 16K5
RGTR F374 16L7
RGTR F374 04K5
RGTR F374 04L7
PAR GEN
2K+1 F280 28K5
2K+1 F280 28L7
NC
+T PAR UPR A 4
+T PAR LWR B 4
BITS 0-15 C 4
+IB00 P1A24
+IB01 P1B24
+IB02 P1A25
+IB03 P1B25
+IB04 P1A26
+IB05 P1B26
+IB06 P1A27
+IB07 P1B27
+IB08 P1A28
+IB09 P1B28
+IB10 P1A29
+IB11 P1B29
+IB12 P1A30
+IB13 P1B30
+IB14 P1A31
+IB15 P1B31
A04-3, A03-2
CONTROL DATA
DEVELOPMENT DIVISION
CYBER DATA BUS I/F WRITE PATH
22179492
C
LØC: A02
C
DATA BUS 2-F
2 OF 8

CYBER Interface - Data (A02-3)

DB1 Register

This register receives 16-bit coupler memory words (bits DB00 through DB15) from the data bus receivers (A02-4) during a DMA or UDI read operation. The DB1 register sends the 16-bit words to the 16-to-8 MUX for a DMA read operation, to the DB2 register for a UDI read operation, and to the parity check circuit (A02-4).

16 to 8 Mux

This multiplexer selects the upper 8-bit bytes (bits 0 through 7) or lower 8-bit bytes (bits 8 through 15) of the 16-bit coupler memory words during a DMA read operation. Only the upper bytes are selected for 8-bit read mode. The odd byte signal (A02-5) gates the lower byte through the multiplexer in 16-bit read mode. The multiplexer sends the 8-bit bytes to the 9-track/disk and 7-track X1 registers.

DB2 Register

This register receives 16-bit coupler memory words from the DB1 register during a UDI read operation. The register sends the 16-bit coupler memory words to the UDI (A03-2) for disassembly.

9-Track/Disk and 7-Track X1 Registers

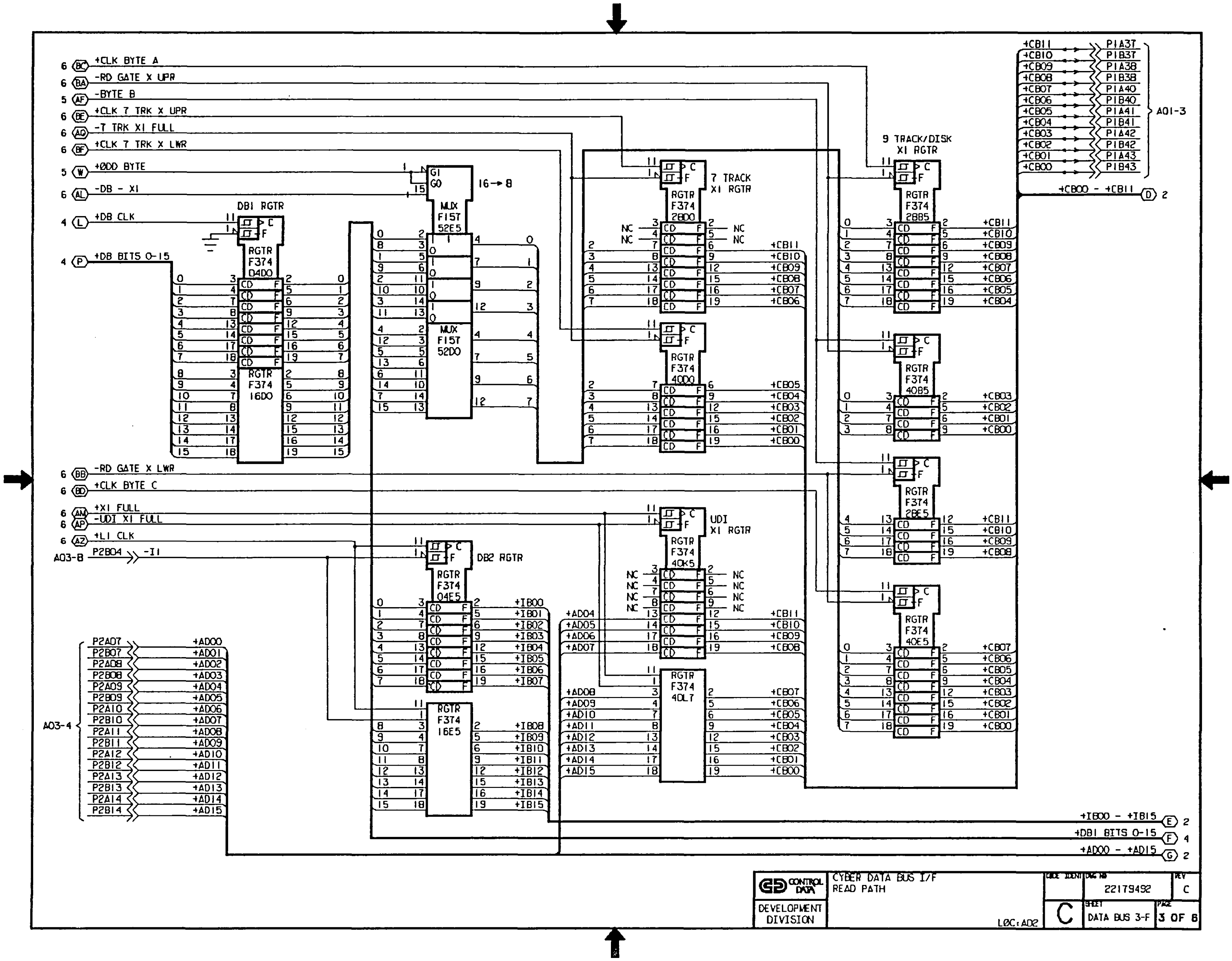
These registers disassemble data during 9-track tape, disk, and 7-track tape DMA read operations. The registers receive 8-bit bytes from the 16- to 8-bit multiplexer.

The 9-track/disk X1 register is a 24-bit register that disassembles three 8-bit coupler memory bytes into two 12-bit channel words. The 7-track X1 register is a 16-bit register that disassembles two 8-bit coupler memory bytes into one 12-bit channel word. The upper two bits of the coupler memory bytes are not used.

The 12-bit channel words are sent from the X1 registers to the channel bus and routed through the X2 register (A01-3) and channel transmitters (A01-3) for transmission to the CYBER channel I/F.

UDI X1 Register

This 16-bit register is used during a UDI read operation. The register receives 12-bit channel words (bits AD04 through AD15) from the UDI disassembly circuit (A03-4). The 12-bit channel words are sent from the UDI X1 register to the CYBER channel in the same manner as those from the 9-track/disk and 7-track X1 registers.


+CLK BYTE A
-RD GATE X UPR
-BYTE B
+CLK 7 TRK X UPR
-T TRK XI FULL
+CLK 7 TRK X LWR
+ØDD BYTE
-DB - XI
+DB CLK
+DB BITS 0-15
DB1 RGTR
RGTR F374 04D0
RGTR F374 16D0
MUX F157 52E5
MUX F157 52D0
16→8
7 TRACK XI RGTR
RGTR F374 28D0
RGTR F374 40D0
9 TRACK/DISK XI RGTR
RGTR F374 28B5
RGTR F374 40B5
RGTR F374 28E5
RGTR F374 40E5
-RD GATE X LWR
+CLK BYTE C
+XI FULL
-UDI XI FULL
+L1 CLK
P2B04
-I1
A03-8
DB2 RGTR
RGTR F374 04E5
RGTR F374 16E5
UDI XI RGTR
RGTR F374 40K5
RGTR F374 40L7
NC
+IB00 - +IB15
+DB1 BITS 0-15
+AD00 - +AD15
+CB00 - +CB11
A01-3
A03-4
P1A37 P1B37 P1A38 P1B38 P1A40 P1B40 P1A41 P1B41 P1A42 P1B42 P1A43 P1B43
CONTROL DATA
DEVELOPMENT DIVISION
CYBER DATA BUS I/F
READ PATH
22179492
C
DATA BUS 3-F
3 OF 8
LØC:AD2

CYBER Interface - Data (A02-4)

Data Bus Transmitters

During a coupler write operation, assembled 16-bit words from the DMA or UDI T register (A02-2) and two parity bits are sent to the transmitters and placed onto the bidirectional data bus. The 16-bit words and parity bits are then written into memory (A07-3).

Data Bus Receivers

During a coupler read operation, 16-bit words and two parity bits are read from memory onto the data bus and sent to the receivers on the same bidirectional pins used by the data bus transmitters. The receivers send the 16-bit coupler memory word to the DB1 register (A02-3) and to the parity check circuit along with the two parity bits.

Parity Check

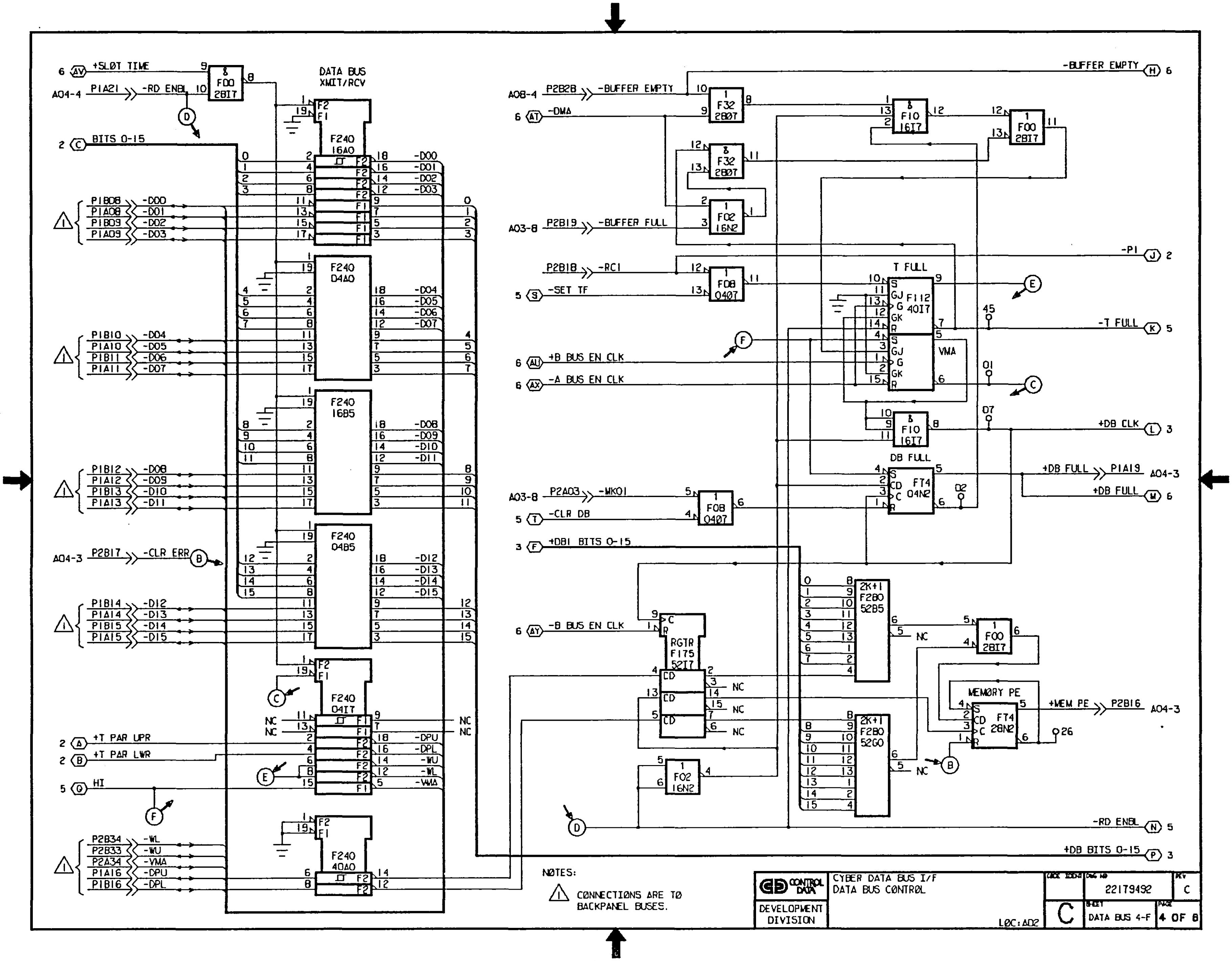
A check for odd parity is performed on the upper and lower 8-bit bytes of the 16-bit coupler memory word from the DB1 register (A02-3) and the associated parity bits from the 520S register. A parity error sets the memory parity FF, and a Mem PE (Memory Parity Error) signal is sent to the control flag register (A04-3).

Data Bus Control Signals

The valid memory address (VMA) FF enables transfer of memory data during coupler read and write operations.

The DB Full FF and Buffer Empty signal (A08-5) control data transfers during a coupler read operation.

The T Full FF and Buffer Full signal (A08-5) control data transfers during a coupler write operation.



NOTES:

⚠ CONNECTIONS ARE TO BACKPANEL BUSES.

CONTROL DATA
DEVELOPMENT DIVISION

CYBER DATA BUS I/F
DATA BUS CONTROL

LOC: A02

DWG NO 22179492
REV C
SIZE C
SHEET DATA BUS 4-F
PAGE 4 OF 8

CYBER Interface - Data (A02-5)

Data Write Control

This logic provides the signals needed to control data transfers during a coupler write operation. Some signals are also used during coupler read operations.

The outputs of the byte A, B, and C FFs and 9-track/disk R3 upper and lower full FFs on this diagram (A02-5) gate 8-bit data bytes through the 9-track/disk R3 registers (A02-2).

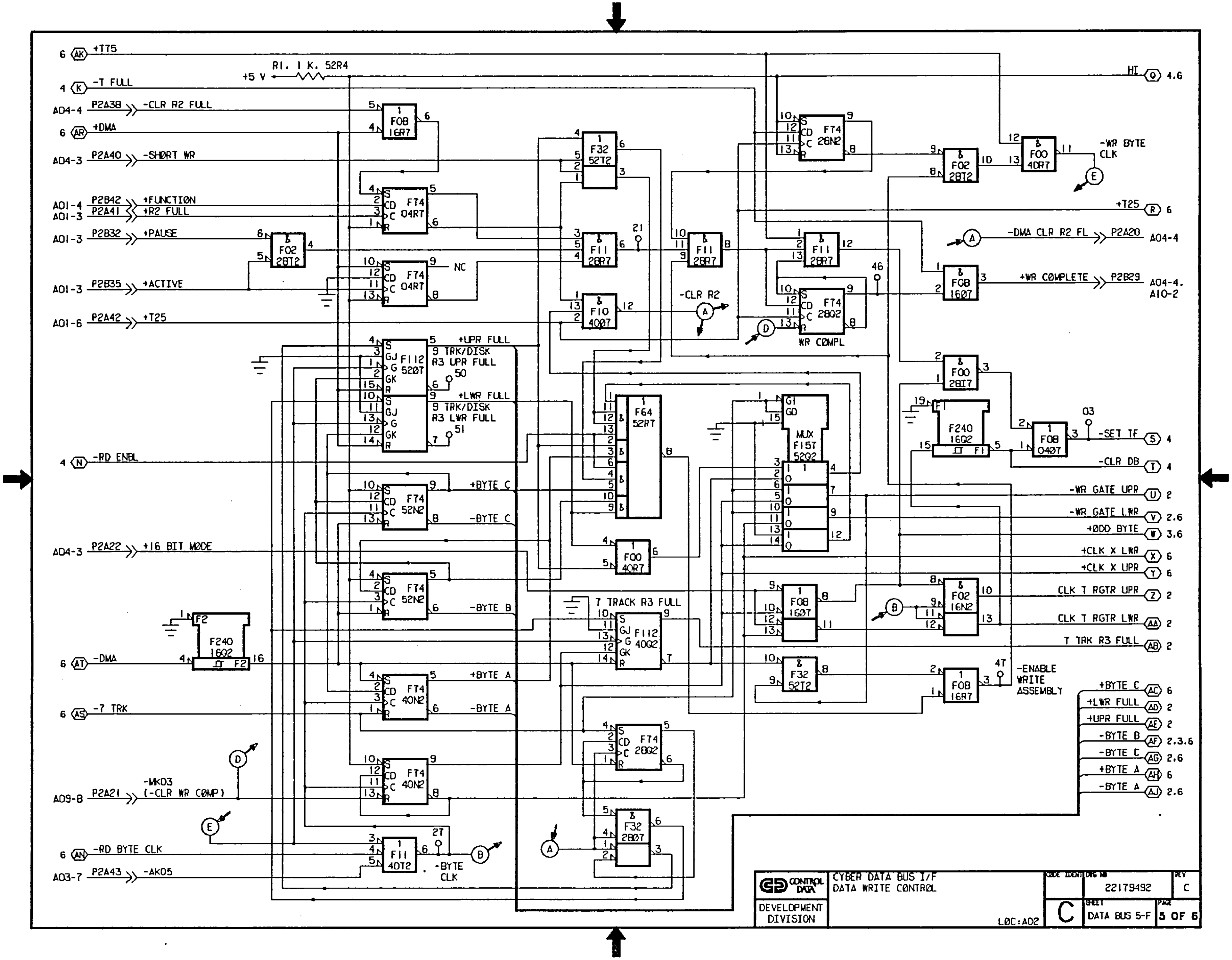
The output of the 7-track R3 full FF and the Write Gate Upper and Write Gate Lower signals gate 8-bit data bytes through the 7-track R3 register (A02-2).

The Clock T Register Upper and Clock T Register Lower signals clock 8-bit data bytes into the DMA T register (A02-2).

The output of the write complete FF informs the CYBER channel interface (A04-4), the FIPS stream logic (A10-2), and the FIPS transfer logic (A10-7) that the write operation is finished.

The outputs of the byte A, B, and C FFs are also sent to the DMA read control circuit (A02-6) for gating 8-bit bytes into the 9-track/disk X1 register.

The Clock X Upper and Clock X Lower signals are used to gate two 8-bit bytes into the 7-track X1 register for DMA read control (A02-6).



CONTROL DATA
DEVELOPMENT DIVISION
CYBER DATA BUS I/F
DATA WRITE CONTROL
LOC:A02
CODE IDENT DWG NO 22179492 REV C
C
SHEET DATA BUS 5-F PAGE 5 OF 6

CYBER Interface - Data (A02-6)

DMA Read Control

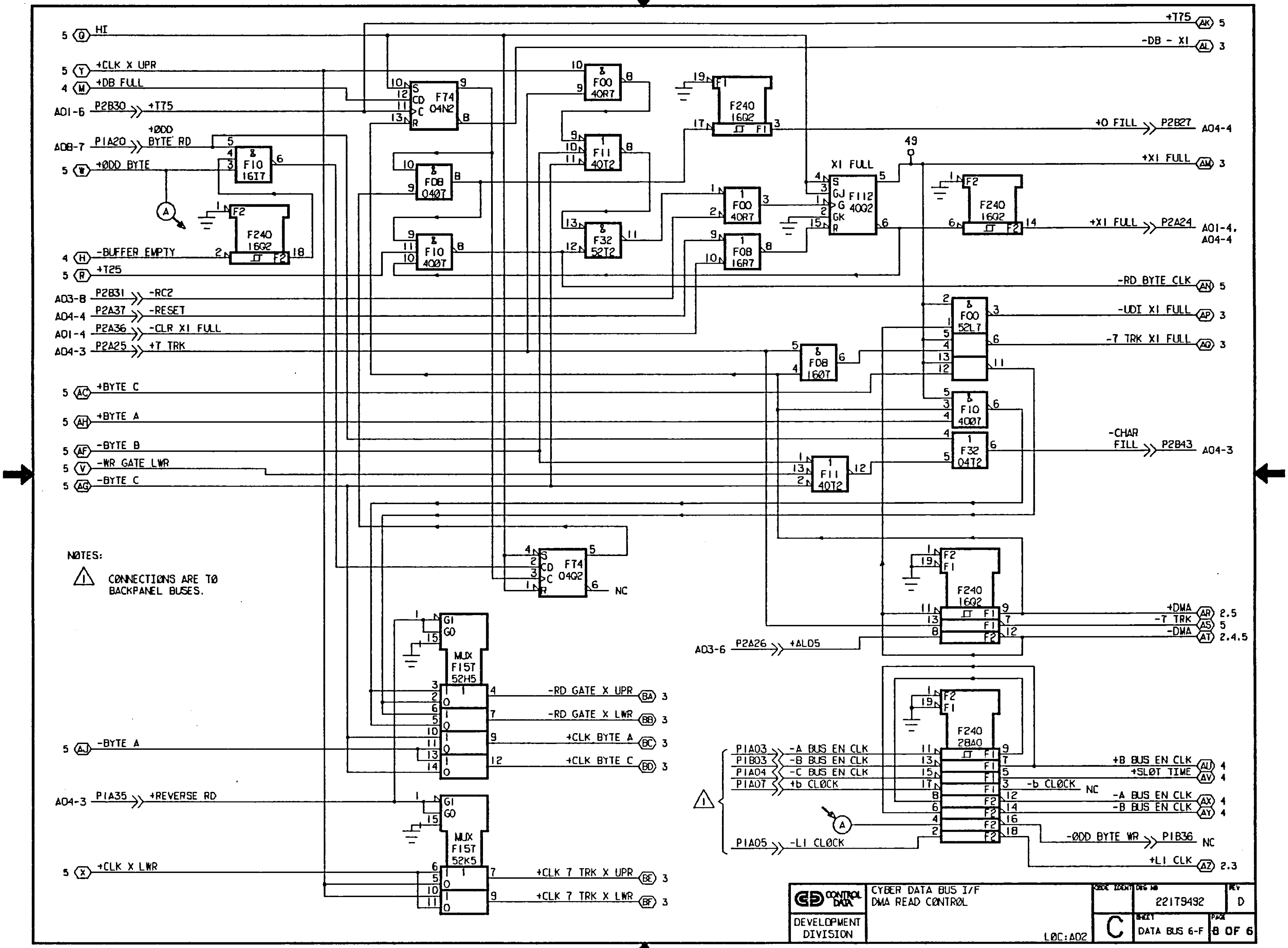
The DMA read control logic provides the signals needed to control data transfers during a DMA read operation.

The output of the X1 full FF enables data to transfer from the UDI, 7-track, or 9-track/disk X1 register (A02-3) to the CYBER channel bus.

The Clock Byte A and Clock Byte C signals are used to gate data into the 9-track/disk X1 register (A02-3). The Read Gate X Upper and Read Gate X Lower signals gate data from the 9-track/disk X1 register (A02-3), onto the channel bus, to the X2 register (A01-3).

The Clock 7-Track X Upper and Clock 7-Track X Lower signals gate data into the 7-track X1 register (A02-3). The 7-Track X1 Full signal gates data from the 7-track X1 register onto the channel bus, and to the X2 register (A01-3).

The X1 Full signal latches data from the UDI assembly/disassembly register (A03-4) into the UDI X1 register (A02-3). The UDI X1 Full signal gates data from the UDI X1 register onto the channel bus, to the X2 register (A01-3).


HI
+CLK X UPR
+DB FULL
P2B30 +T75
P1A20 +ODD BYTE RD
+ODD BYTE
-BUFFER EMPTY
+T25
P2B31 -RC2
P2A37 -RESET
P2A36 -CLR X1 FULL
P2A25 +T TRK
+BYTE C
+BYTE A
-BYTE B
-WR GATE LWR
-BYTE C
-BYTE A
P1A35 +REVERSE RD
+CLK X LWR
F74 04N2
F00 40R7
F11 40T2
F240 16Q2
F10 16I7
F08 04Q7
F10 40Q7
F32 52T2
F00 40R7
F08 16R7
X1 FULL
F112 40Q2
F00 52L7
F08 16Q7
F10 40Q7
F32 04T2
F11 40T2
F74 04Q2
MUX F157 52H5
MUX F157 52K5
F240 28A0
+T75
-DB - X1
+O FILL P2B27 A04-4
+X1 FULL
+X1 FULL P2A24 A01-4, A04-4
-RD BYTE CLK
-UDI X1 FULL
-T TRK X1 FULL
-CHAR FILL P2B43 A04-3
+DMA
-T TRK
-DMA
P2A26 +ALOS
-RD GATE X UPR
-RD GATE X LWR
+CLK BYTE A
+CLK BYTE C
+CLK 7 TRK X UPR
+CLK 7 TRK X LWR
P1A03 -A BUS EN CLK
P1B03 -B BUS EN CLK
P1A04 -C BUS EN CLK
P1A07 +b CLOCK
P1A05 -L1 CLOCK
+B BUS EN CLK
+SLOT TIME
-b CLOCK NC
-A BUS EN CLK
-B BUS EN CLK
-ODD BYTE WR P1B36 NC
+L1 CLK
NOTES:
CONNECTIONS ARE TO BACKPANEL BUSES.
CONTROL DATA
DEVELOPMENT DIVISION
CYBER DATA BUS I/F
DMA READ CONTROL
LOC:A02
22IT9492
D
C
DATA BUS 6-F
8 OF 6

CYBER 2K-UDI (A03)

The revision levels for the CYBER 2K-UDI diagrams are shown on the facing page.

PAGE									REVISION RECORD					
9	8	7	6	5	4	3	2	1	ECO	DESCRIPTION	DRFT	DATE	CHKD	APVD
A	A	A	A	A	A	A	A	A	CA48097	CLASS A RELEASE	MES	8/12/86	NS	NS
B	B	B	B	B	B	B	B	B	CA48239	ADDED COVER, RE-INTERSHEET	MES	1/22/87	NS	NS
B	B	B	B	B	B	B	B	C	CA48882	NEW PWA NUMBER	KWS	5/11/87	NS	NS
B	B	B	B	B	B	B	B	D	CA49315	NEW PWA NUMBER	KWS	3/21/88	KS	KS

NOTES:

1. THIS DOCUMENT IS CONTAINED ON MAGNETIC TAPE. MAGNETIC TAPE IS STORED IN THE EDP GROUP OF ENGINEERING SERVICES SECTION, CDED DIVISION.
2. UPDATES TO LOGIC PRINTS MUST BE PERFORMED BY CALMA.
3. THE OFF SHEET SIGNAL REFERENCES DESIGNATE THE PAGE IN THE TITLE BLOCK AREA ON DIAGRAMS.
4. THE CHIP IDENTIFIERS ON PWA-22110341 WERE CHANGED TO 'F' TYPE CHIPS, UNLESS OTHERWISE NOTED. EXAMPLE - 'F74' ON PWA-22110341 IS 'S74' ON PWA-53590826.

DETACHED LISTS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN
TOLERANCES
PLACE ± PLACE ± ANGLES ±
MATERIAL
FINISH

DWN	M E SCHMIDT	08/86
CHKD	N SAMPSON	08/86
ENGR	L B ULFIG	08/86
MFG	R J REILAND	08/86
APVD	L B ULFIG	08/86

EQUIP. NO. FR205-B

THIRD ANGLE PROJECTION

CONTROL DATA

ARDEN HILLS OPERATIONS
ST. PAUL, MINN.

TITLE

LOGIC DIAGRAM
CYBER 2K UDI

PWA-10284351
PWB-67046086

SIZE C
FSCM NO. 34010
DWG NO. 22110161
A03
SHEET UDIC 2K-1-F
PAGE 1 OF 9

CALMA

CSIZECOVER2

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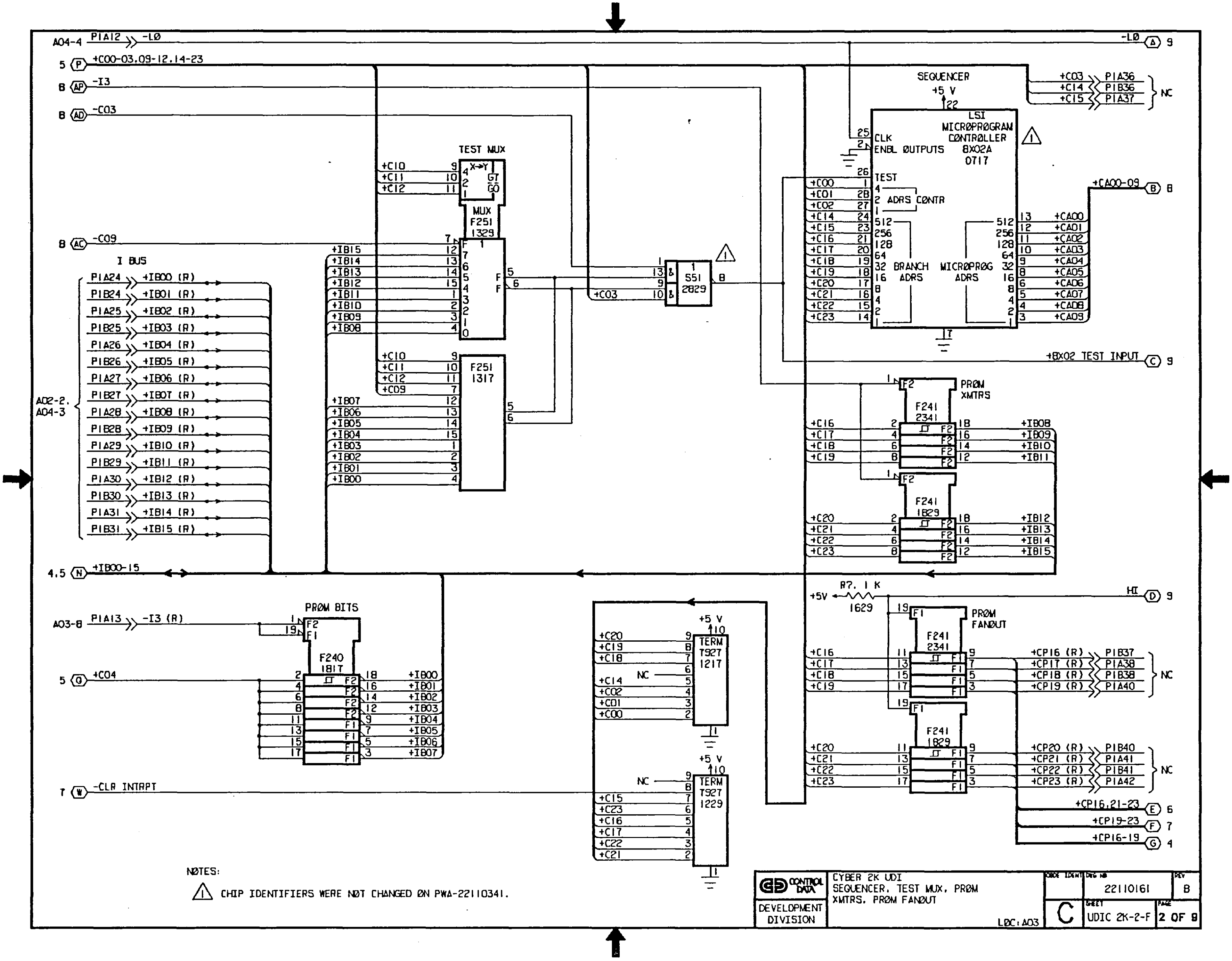

NOTES:

⚠ CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-22110341.

CONTROL DATA

DEVELOPMENT DIVISION

CYBER 2K UDI
SEQUENCER, TEST MUX, PROM
XMTRS, PROM FANOUT

LOC: A03

SIZE	DWG NO	REV
C	22110161	B
	SHEET UDIC 2K-2-F	PAGE 2 OF 9

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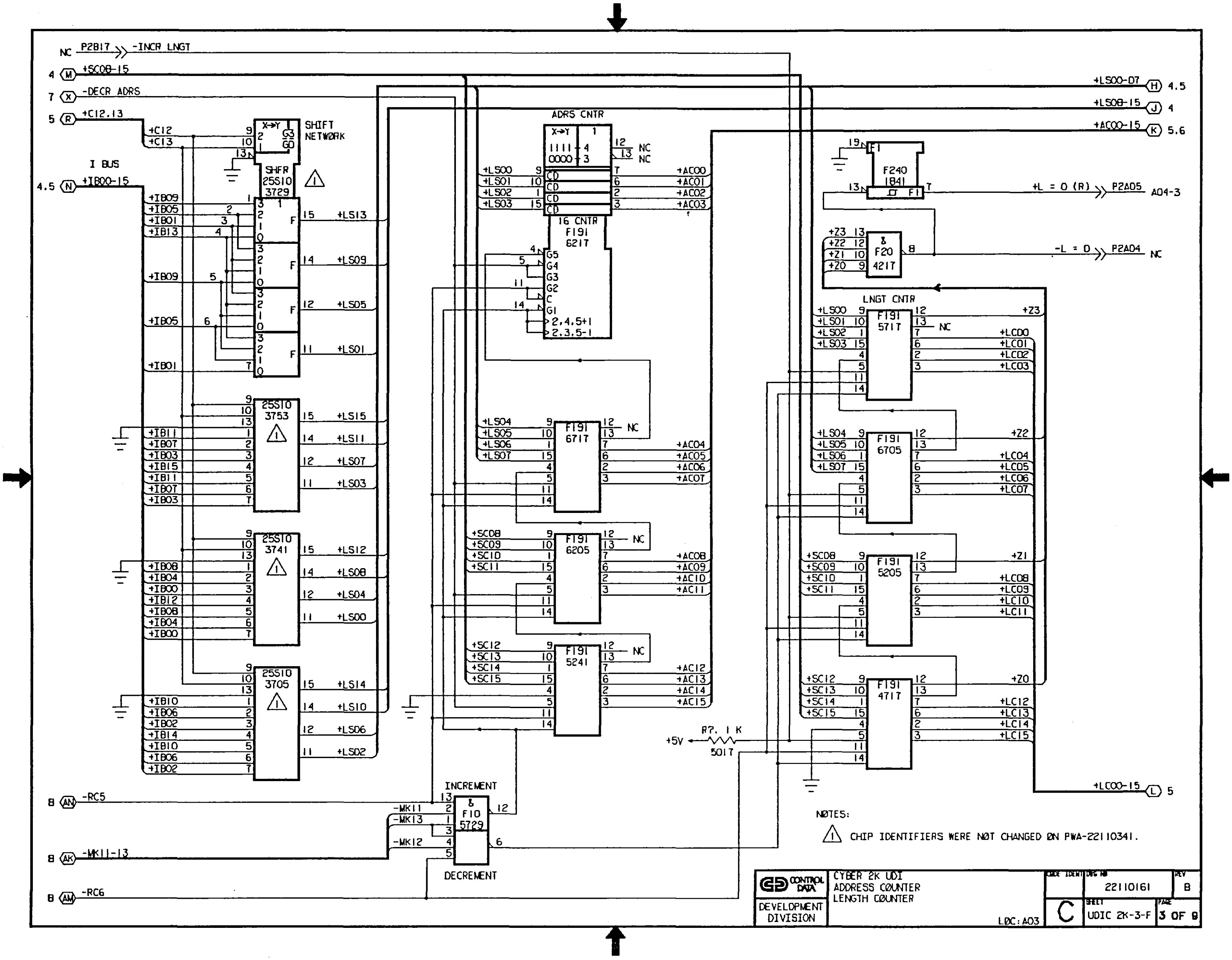
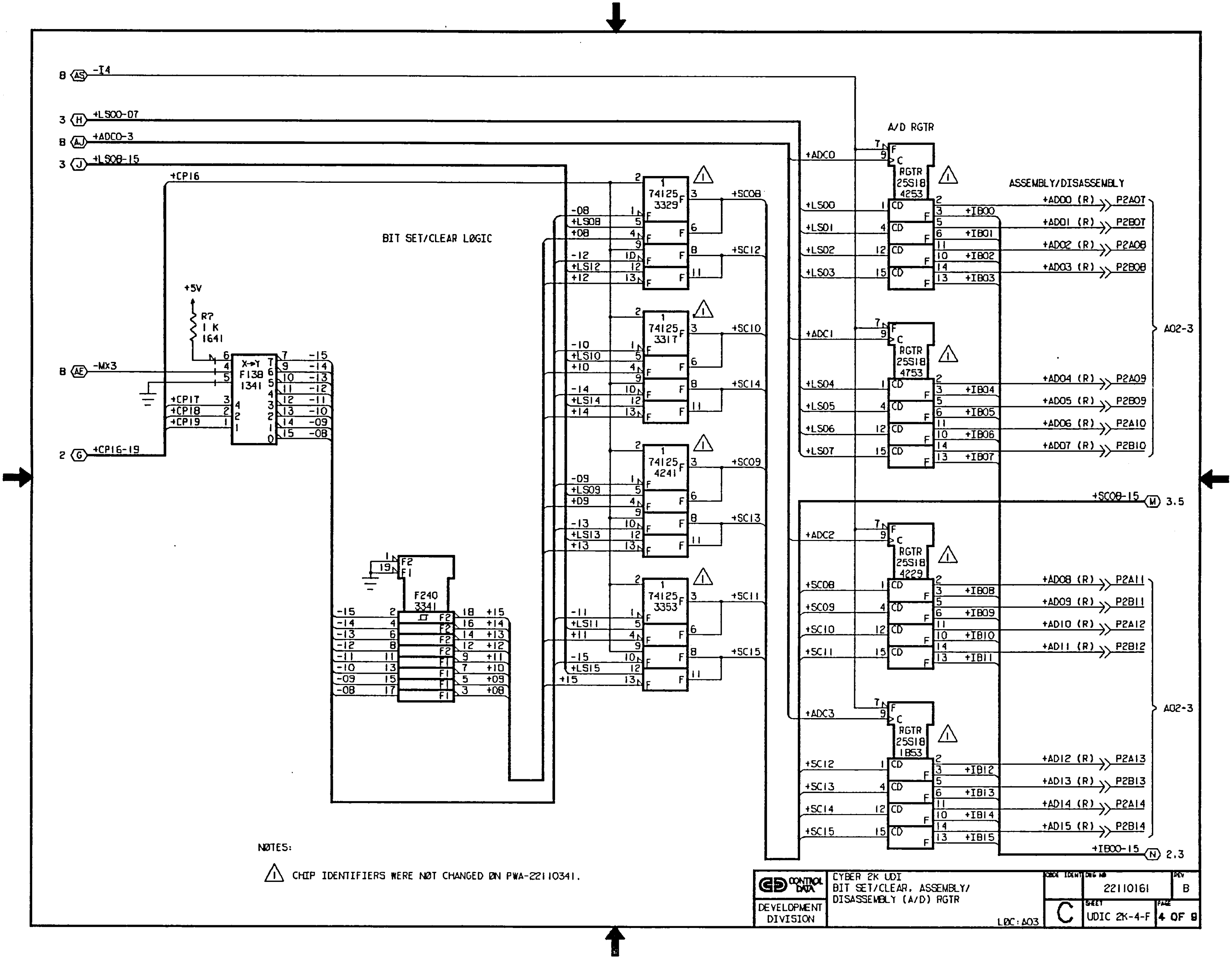


NOTES:

⚠ CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-22110341.

CONTROL DATA DEVELOPMENT DIVISION	CYBER 2K UDI ADDRESS COUNTER LENGTH COUNTER LOC: A03	CODE IDENT	DWG NO 22110161	REV B
		C	SHEET UDIC 2K-3-F	PAGE 3 OF 9

To present the information in this chapter in a structured format, this page has been left blank.



NØTES:

⚠ CHIP IDENTIFIERS WERE NØT CHANGED ØN PWA-22110341.

CONTROL DATA
DEVELOPMENT DIVISION

CYBER 2K UDI
BIT SET/CLEAR, ASSEMBLY/
DISASSEMBLY (A/D) RGTR

LØC: A03

22110161

B

C

UDIC 2K-4-F

4 OF 8

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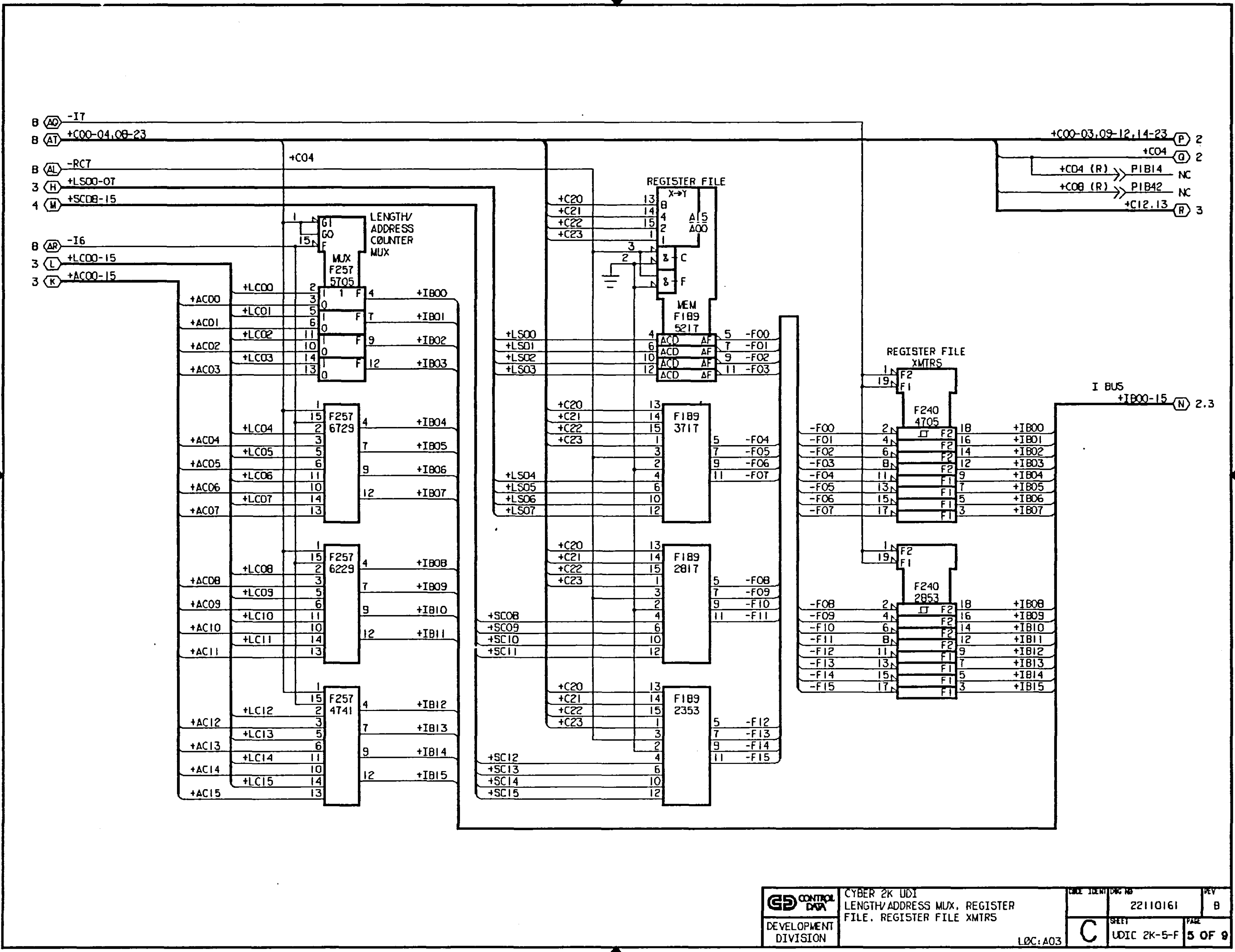
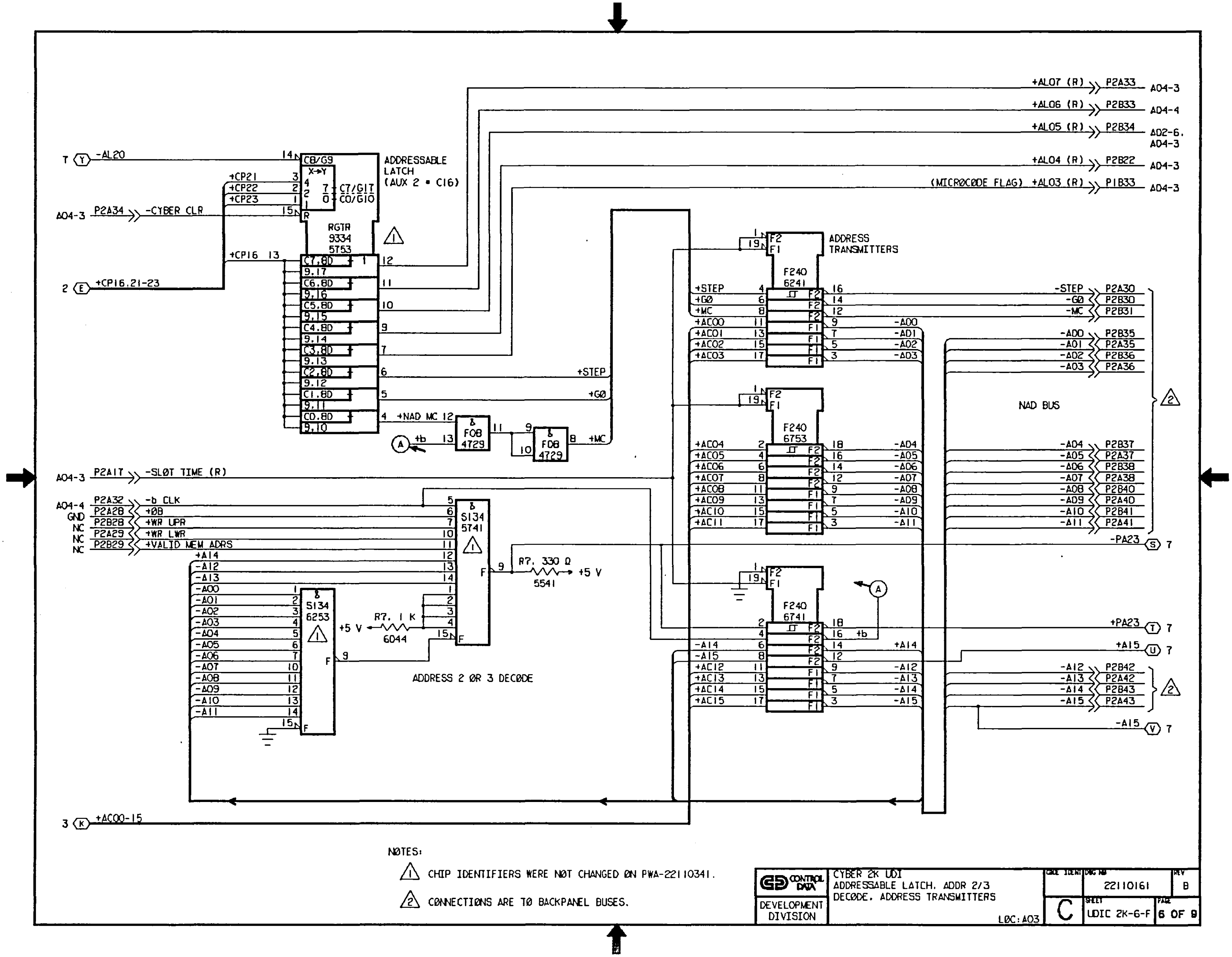

B AQ -I7
B AT +C00-04,08-23
B AL -RC7
3 H +LS00-07
4 M +SC08-15
8 AR -I6
3 L +LC00-15
3 K +AC00-15
+C04
LENGTH/ ADDRESS COUNTER MUX
MUX F257 5705
F257 6729
F257 6229
F257 4741
+AC00
+AC01
+AC02
+AC03
+AC04
+AC05
+AC06
+AC07
+AC08
+AC09
+AC10
+AC11
+AC12
+AC13
+AC14
+AC15
+LC00
+LC01
+LC02
+LC03
+LC04
+LC05
+LC06
+LC07
+LC08
+LC09
+LC10
+LC11
+LC12
+LC13
+LC14
+LC15
+IB00
+IB01
+IB02
+IB03
+IB04
+IB05
+IB06
+IB07
+IB08
+IB09
+IB10
+IB11
+IB12
+IB13
+IB14
+IB15
REGISTER FILE
X→Y
MEM F189 5217
F189 3717
F189 2817
F189 2353
+C20
+C21
+C22
+C23
+LS00
+LS01
+LS02
+LS03
+LS04
+LS05
+LS06
+LS07
+SC08
+SC09
+SC10
+SC11
+SC12
+SC13
+SC14
+SC15
ACD AF
-F00
-F01
-F02
-F03
-F04
-F05
-F06
-F07
-F08
-F09
-F10
-F11
-F12
-F13
-F14
-F15
REGISTER FILE XMTRS
F240 4705
F240 2853
I BUS
+IB00-15 N 2,3
+C00-03,09-12,14-23 P 2
+C04 Q 2
+C04 (R) P1B14 NC
+C08 (R) P1B42 NC
+C12,13 R 3
CONTROL DATA
DEVELOPMENT DIVISION
CYBER 2K UDI
LENGTH/ADDRESS MUX, REGISTER FILE, REGISTER FILE XMTRS
LOC: A03
C
22110161
B
UDIC 2K-5-F
5 OF 9

To present the information in this chapter in a structured format, this page has been left blank.



NOTES:

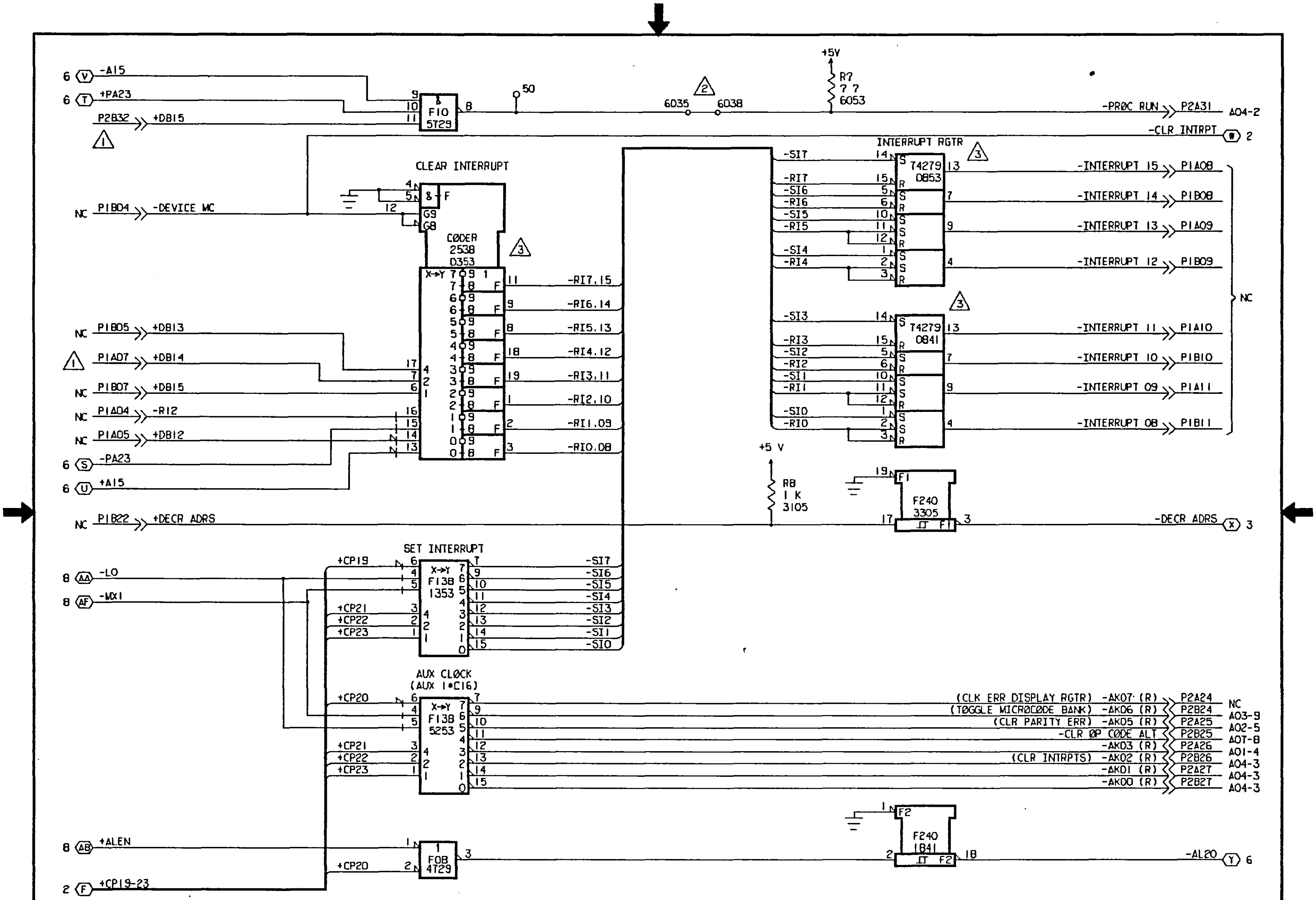
1. CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-22110341.
2. CONNECTIONS ARE TO BACKPANEL BUSES.

CONTROL DATA
DEVELOPMENT DIVISION

CYBER 2K UDI
ADDRESSABLE LATCH, ADDR 2/3
DECODE, ADDRESS TRANSMITTERS
LOC: A03

CODE IDENT	DWG NO	REV
C	22110161	B
SHEET	UDIC 2K-6-F	PAGE 6 OF 9

To present the information in this chapter in a structured format, this page has been left blank.

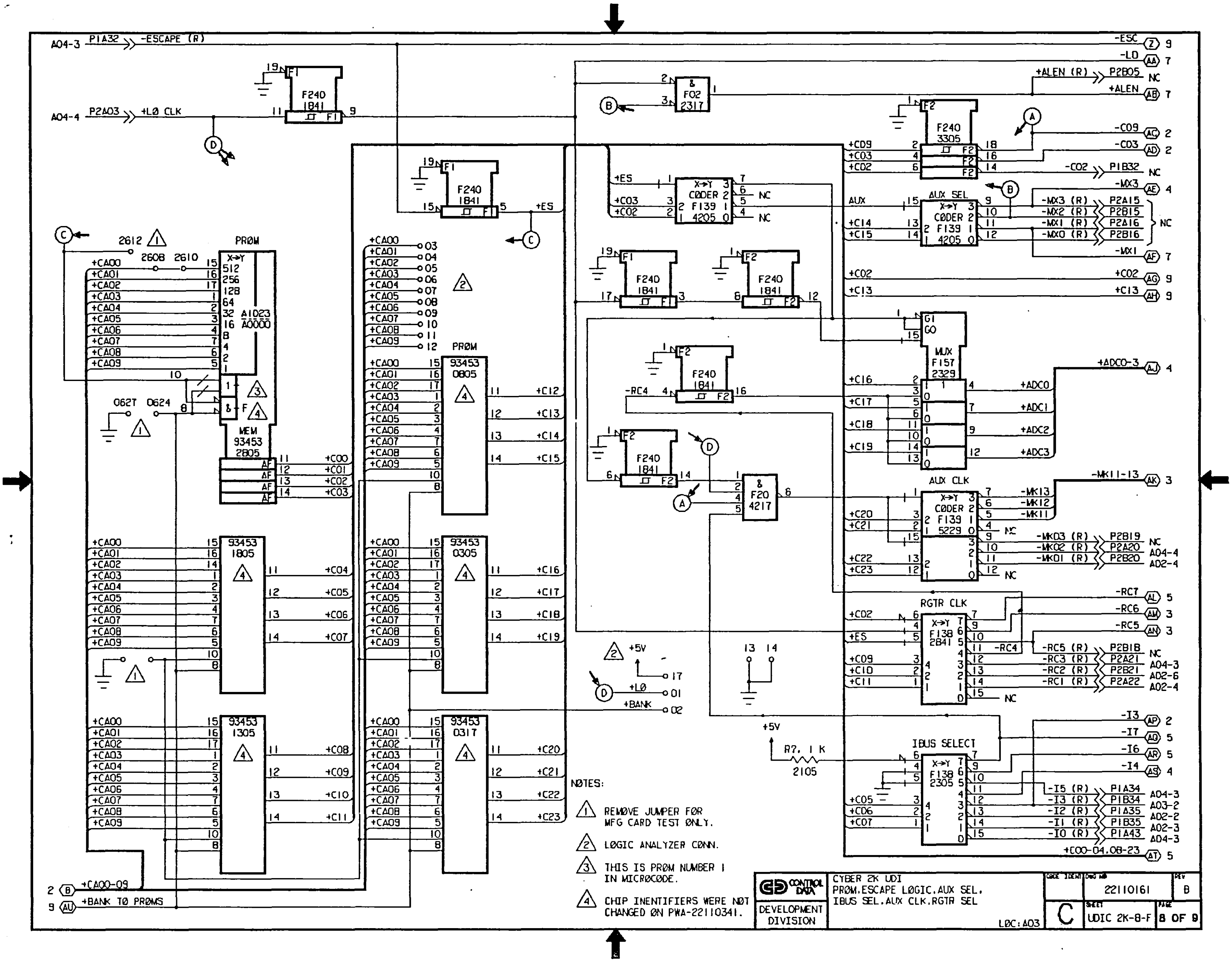


NØTES:

1. P2B32 AND P1A07 ARE TIED TØGETHER ØN THE BACKPANEL.
2. REMØVE JUMPER FØR MFG CARD TEST ØNLY.
3. CHIP IDENTIFIERS WERE NØT CHANGED ØN PWA-22110341.

CONTROL DATA DEVELOPMENT DIVISION	CYBER 2K UDI SET/CLR INTERRUPTS, INTERRUPT RGTR, AUX CLØCK LØC: A03	C	DWG NO 22110161 SHEET UDIC 2K-7-F	REV B PAGE 7 OF 9

To present the information in this chapter in a structured format, this page has been left blank.

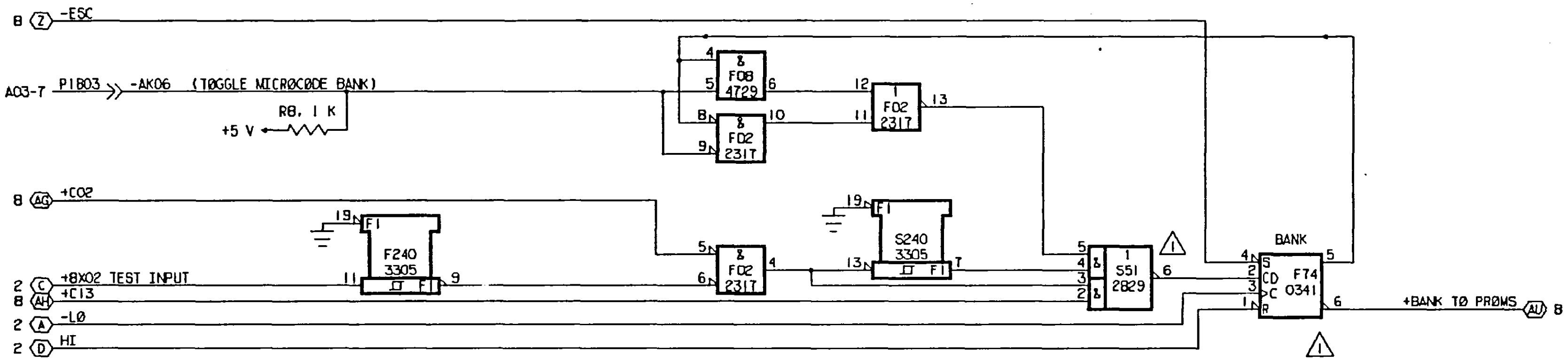


NOTES:

1. REMØVE JUMPER FØR MFG CARD TEST ØNLY.
2. LØGIC ANALYZER CØNN.
3. THIS IS PRØM NUMBER 1 IN MICRØCØDE.
4. CHIP INENTIFIERS WERE NØT CHANGED ØN PWA-22110341.

CONTROL DATA DEVELOPMENT DIVISION	CYBER 2K UDI PRØM,ESCAPE LØGIC,AUX SEL, IBUS SEL,AUX CLK,RGTR SEL LØC:A03	CODE IDENT	DWG NO 22110161	REV B
		C	SHEET UDIC 2K-8-F	PAGE 8 OF 9

To present the information in this chapter in a structured format, this page has been left blank.



NOTES:

1 CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-22110341.

CONTROL DATA	CYBER 2K UDI	CODE IDENT	DWG NO 22110161	REV B
DEVELOPMENT DIVISION	LOC:A03	C	SHEET UDIC 2K-9-F	PAGE 9 OF 9

CYBER Status/Clock (A04)

The revision levels for the CYBER Status/Clock diagrams are shown on the facing page (A04-1).

UNUSED IC'S

CHIP TYPE	LOCATION	OPEN PINS
F04	28D0	(1.2).(3.4).(13.12)
F240	04N2	(11.9).(13.7).(15.5)
F240	28N2	(2.18)
F32	04I7	(4.5.6).(9.10.8).(12.13.11)

UNUSED RESISTORS

VALUE	LOCATION	PINS	RESISTOR	+5 V	GND
180.390	04C1	4.5.6.7.8	RP4	X	X
180.390	04R7	6.7.8.9	RP5	X	X
180.390	04S3	8.9	RP6	X	X

PAGE					REVISION RECORD					
5	4	3	2	1	ECO	DESCRIPTION	DRFT	DATE	CHKD	APVD
A	A	A	A	A		CLASS A DRAWING	MES	4/30/87	NS	NS

NOTES:

1. THIS DOCUMENT IS CONTAINED ON MAGNETIC TAPE. MAGNETIC TAPE IS STORED IN THE EDP GROUP OF ENGINEERING SERVICES SECTION, CDED DIVISION.
2. UPDATES TO LOGIC PRINTS MUST BE PERFORMED BY CALMA.
3. THE OFF SHEET SIGNAL REFERENCES DESIGNATE THE PAGE IN THE TITLE BLOCK AREA ON DIAGRAMS.

DETACHED LISTS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN

TOLERANCES

PLACE ± PLACE ± ANGLES ±

MATERIAL

FINISH

DWN	M E SCHMIDT	4/30/87
CHKD	N SAMPSON	4/30/87
ENGR	G R HODD	4/30/87
MFG	B J REILAND	5/15/87
APVD	L B ULFIG	5/13/87

EQUIP. NO. FR205-B

THIRD ANGLE PROJECTION

CONTROL DATA

ARDEN HILLS OPERATIONS
ST. PAUL, MINN.

TITLE

LOGIC DIAGRAM
CYBER STATUS/CLOCKS

PWA-22137381

PWB-22137382

SIZE	FSCM NO.	DWG NO.
C	34010	22137383

A04

SHEET STAT/CLK 1

PAGE 1 OF 5

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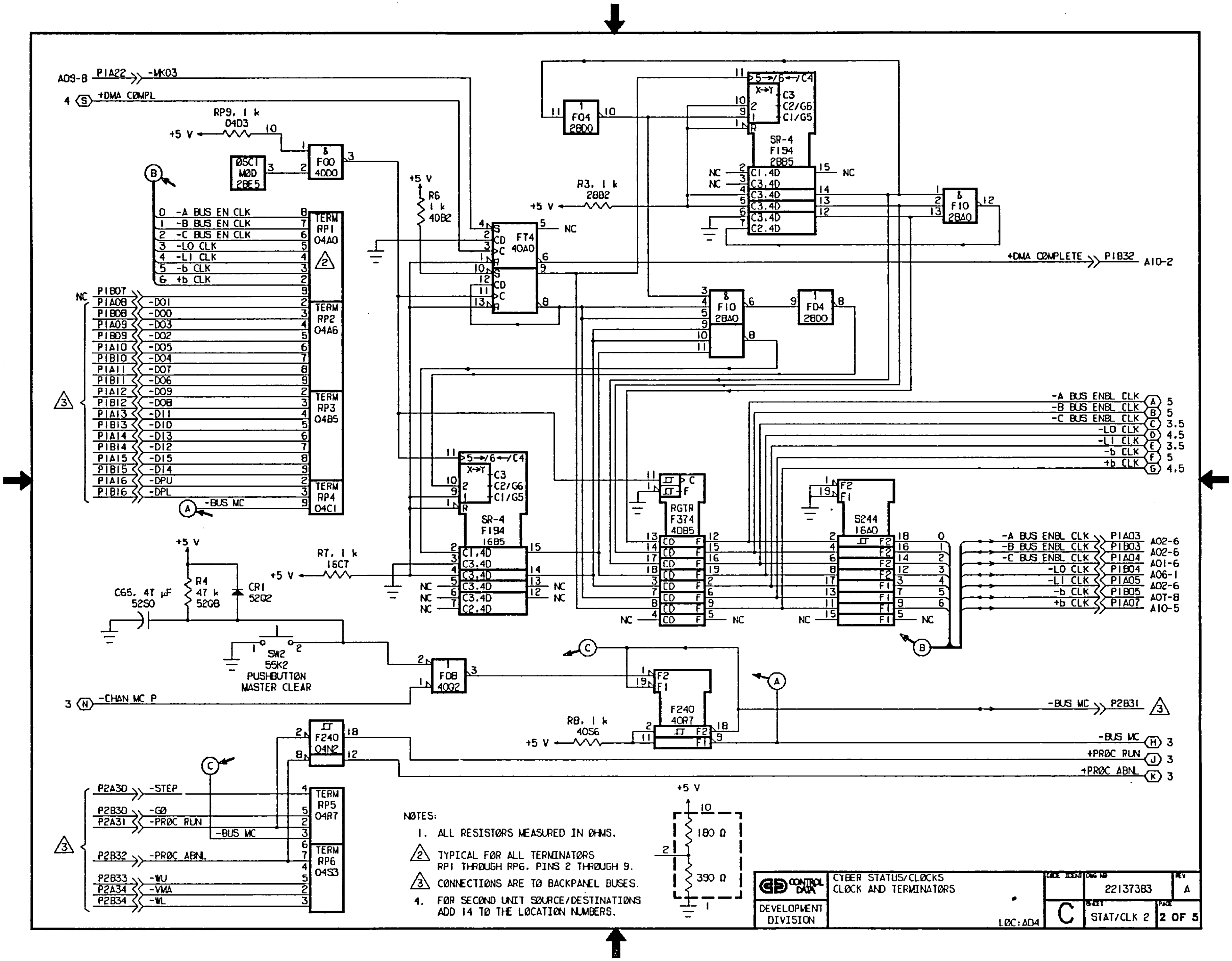

NOTES:

1. ALL RESISTORS MEASURED IN OHMS.
2. TYPICAL FOR ALL TERMINATORS RP1 THROUGH RP6. PINS 2 THROUGH 9.
3. CONNECTIONS ARE TO BACKPANEL BUSES.
4. FOR SECOND UNIT SOURCE/DESTINATIONS ADD 14 TO THE LOCATION NUMBERS.

CONTROL DATA
DEVELOPMENT DIVISION
CYBER STATUS/CLOCKS
CLOCK AND TERMINATORS
LOC: A04

CAGE IDENT	DWG NO	REV
C	22137383	A
	SHEET STAT/CLK 2	PAGE 2 OF 5

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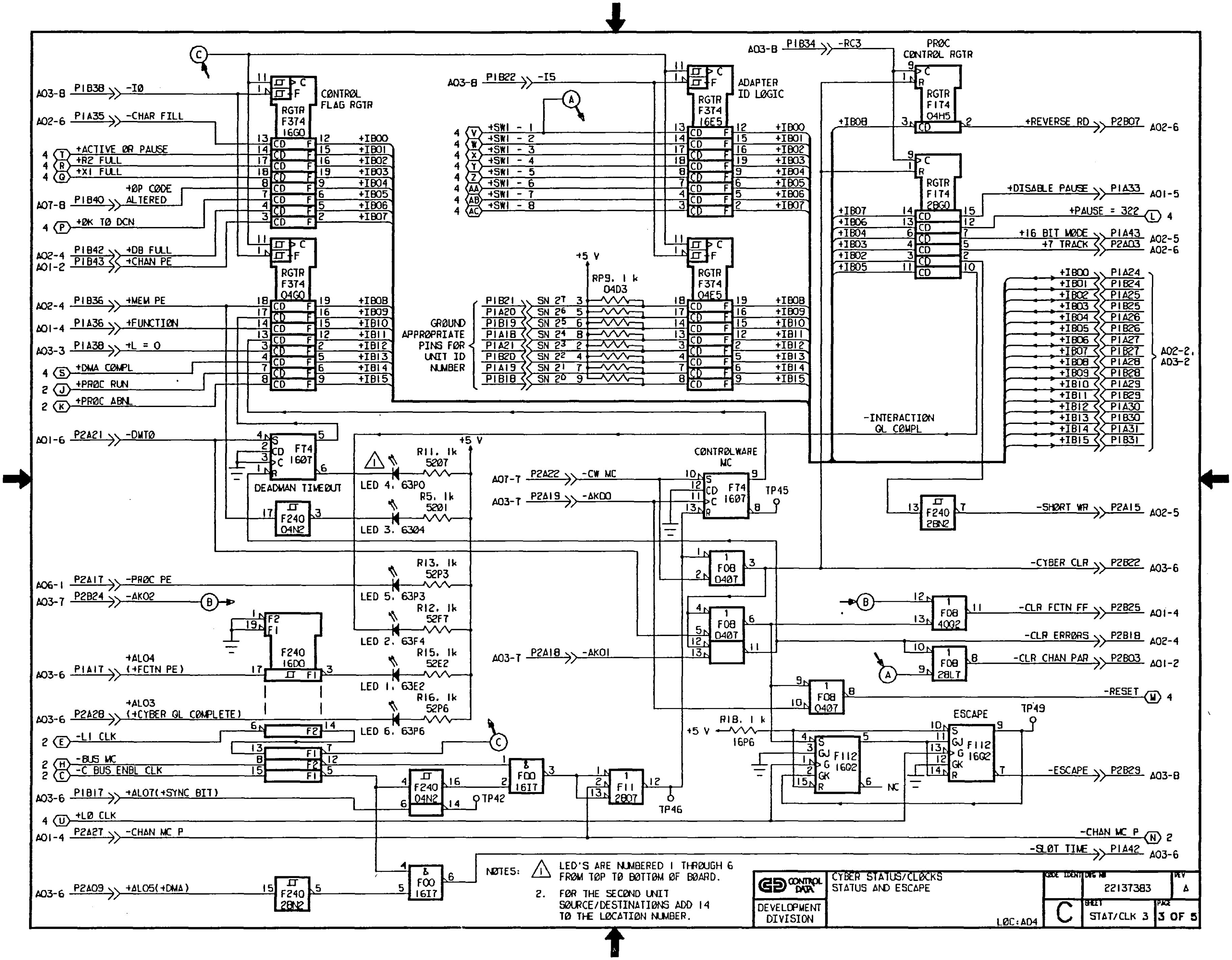


NOTES: 1. LED'S ARE NUMBERED 1 THROUGH 6 FROM TOP TO BOTTOM OF BOARD.

2. FOR THE SECOND UNIT SOURCE/DESTINATIONS ADD 14 TO THE LOCATION NUMBER.

CONTROL DATA

DEVELOPMENT DIVISION

CYBER STATUS/CLOCKS
STATUS AND ESCAPE

DWG NO 22137383

REV A

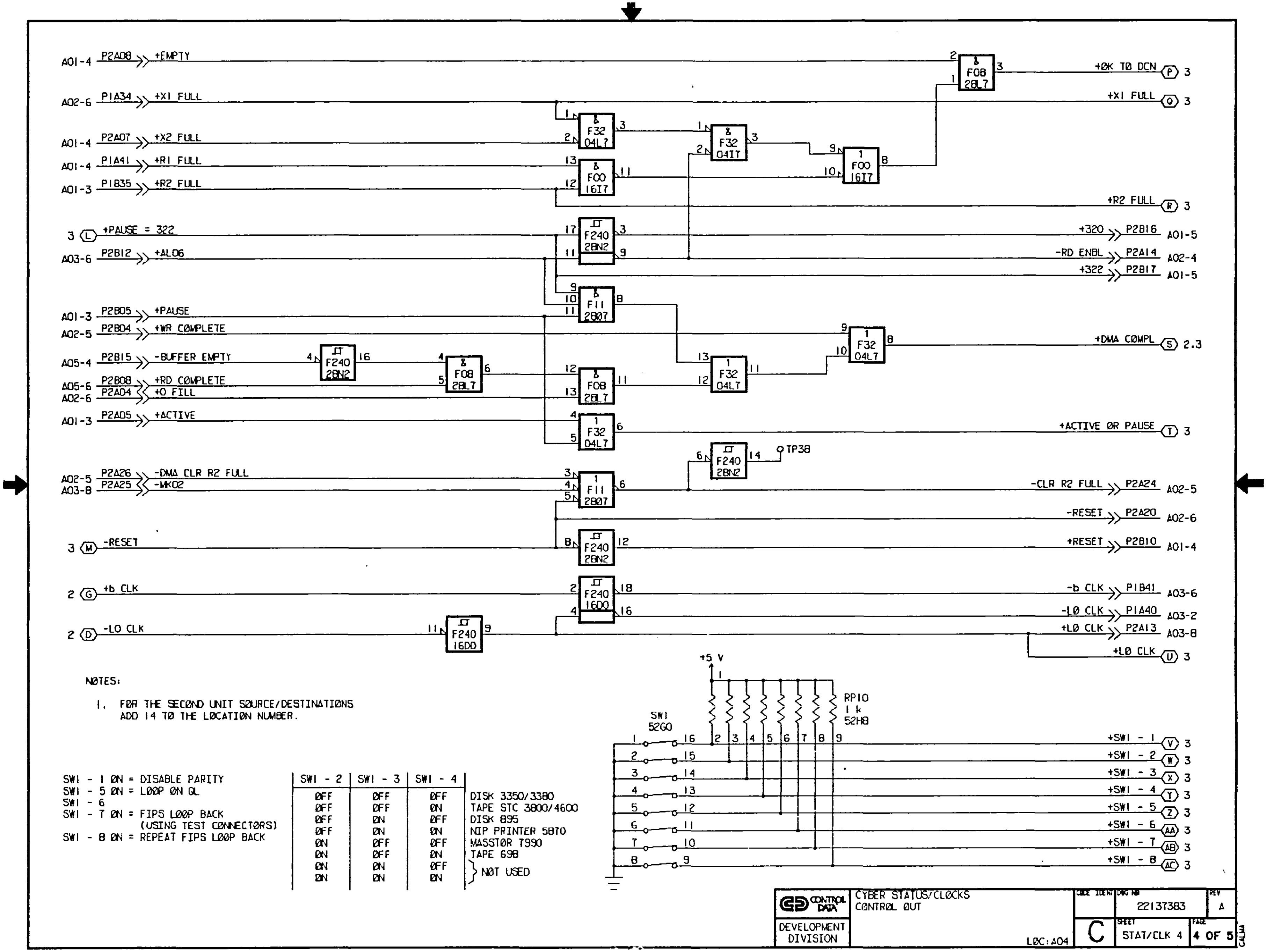
C

SHEET STAT/CLK 3

PAGE 3 OF 5

LOC: A04

To present the information in this chapter in a structured format, this page has been left blank.



NOTES:

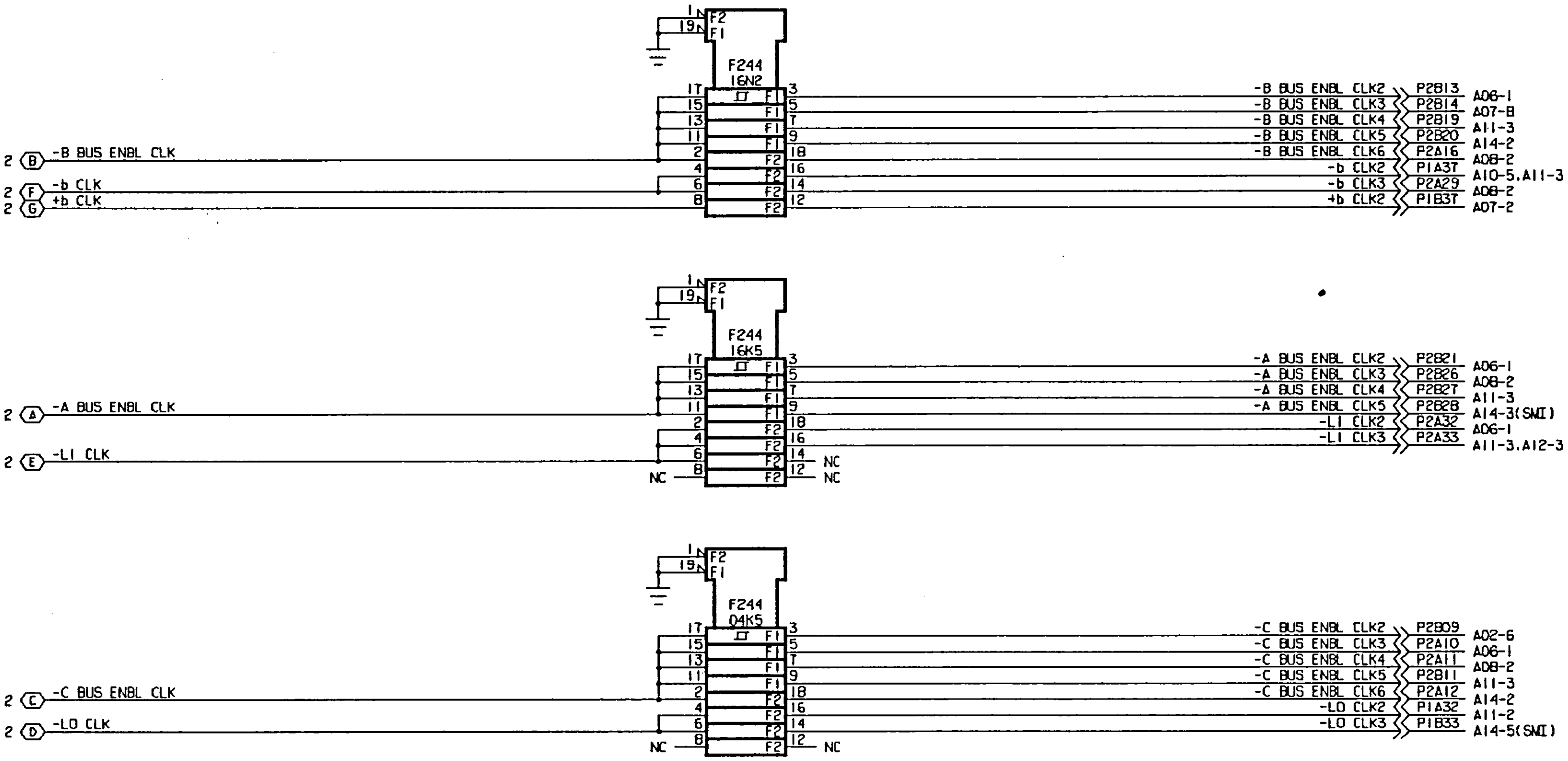
1. FOR THE SECOND UNIT SOURCE/DESTINATIONS ADD 14 TO THE LOCATION NUMBER.

SW1 - 1 ON = DISABLE PARITY
SW1 - 5 ON = LOOP ON QL
SW1 - 6
SW1 - 7 ON = FIPS LOOP BACK (USING TEST CONNECTORS)
SW1 - 8 ON = REPEAT FIPS LOOP BACK

SW1 - 2	SW1 - 3	SW1 - 4	
OFF	OFF	OFF	DISK 3350/3380
OFF	OFF	ON	TAPE STC 3800/4600
OFF	ON	OFF	DISK 895
OFF	ON	ON	NIP PRINTER 5870
ON	OFF	OFF	MASSTOR 7990
ON	OFF	ON	TAPE 698
ON	ON	OFF	NOT USED
ON	ON	ON	

CONTROL DATA
DEVELOPMENT DIVISION
CYBER STATUS/CLOCKS
CONTROL OUT
LOC: A04
CODE IDENT
DWG NO 22137383
REV A
C
SHEET STAT/CLK 4
PAGE 4 OF 5

To present the information in this chapter in a structured format, this page has been left blank.


F244
16N2
2 B -B BUS ENBL CLK
2 F -b CLK
2 G +b CLK
-B BUS ENBL CLK2 P2B13 A06-1
-B BUS ENBL CLK3 P2B14 A07-8
-B BUS ENBL CLK4 P2B19 A11-3
-B BUS ENBL CLK5 P2B20 A14-2
-B BUS ENBL CLK6 P2A16 A08-2
-b CLK2 P1A37 A10-5,A11-3
-b CLK3 P2A29 A08-2
+b CLK2 P1B37 A07-2
F244
16K5
2 A -A BUS ENBL CLK
2 E -L1 CLK
-A BUS ENBL CLK2 P2B21 A06-1
-A BUS ENBL CLK3 P2B26 A08-2
-A BUS ENBL CLK4 P2B27 A11-3
-A BUS ENBL CLK5 P2B28 A14-3(SNI)
-L1 CLK2 P2A32 A06-1
-L1 CLK3 P2A33 A11-3,A12-3
NC
F244
04K5
2 C -C BUS ENBL CLK
2 D -L0 CLK
-C BUS ENBL CLK2 P2B09 A02-6
-C BUS ENBL CLK3 P2A10 A06-1
-C BUS ENBL CLK4 P2A11 A08-2
-C BUS ENBL CLK5 P2B11 A11-3
-C BUS ENBL CLK6 P2A12 A14-2
-L0 CLK2 P1A32 A11-2
-L0 CLK3 P1B33 A14-5(SNI)
NC

NOTES:

1. FOR THE SECOND UNIT SOURCE/DESTINATIONS ADD 14 TO THE LOCATION NUMBER.

CONTROL DATA	CYBER STATUS/CLOCKS CLOCK FANOUT DRIVERS	CODE IDENT	DWG NO 22137383	REV A
DEVELOPMENT DIVISION	LOC:A04	C	SHEET STAT/CLK 5	PAGE 5 OF 5

Processor ALU (A05)

The processor arithmetic logic unit (ALU) is an internally programmed, parallel mode device that controls basic internal operations on the data bus, CYBER channel interface, and FIPS device interface of the coupler. For details of operation, including the internal instruction set of the processor, refer to appendix B of the CYBER Channel Coupler FR205-A/B, FV720-A/B Hardware Reference Manual (publication number 60459170).

The revision levels for the Processor ALU diagrams are shown on the facing page (A05-1).

PAGE									REVISION RECORD					
9	8	7	6	5	4	3	2	1	ECO	DESCRIPTION	DRFT	DATE	CHKD	APVD
A	A	A	A	A	A	A	A	A	CA48508	CLASS A RELEASE	KMS	06/87	NS	NS

NOTES:

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DETACHED LISTS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN

TOLERANCES

PLACE ± PLACE ± ANGLES ±

MATERIAL

FINISH

DWN	M E SCHMIDT	06/87
CHKD	N SAMPSON	06/87
ENGR	R CAIN	06/87
MFG		
APVD	L B ULFIG	06/87

EQUIP. NO. FR205-B

THIRD ANGLE PROJECTION

CONTROL DATA

ARDEN HILLS OPERATIONS
ST. PAUL. MINN.

TITLE

LOGIC DIAGRAM
PROCESSOR ALU

PWA-53595819

PWB-52803442

SIZE	FSCM NO.	DWG NO.
C	34010	22110696

A05

SHEET PROC ALU I

PAGE 1 OF 9

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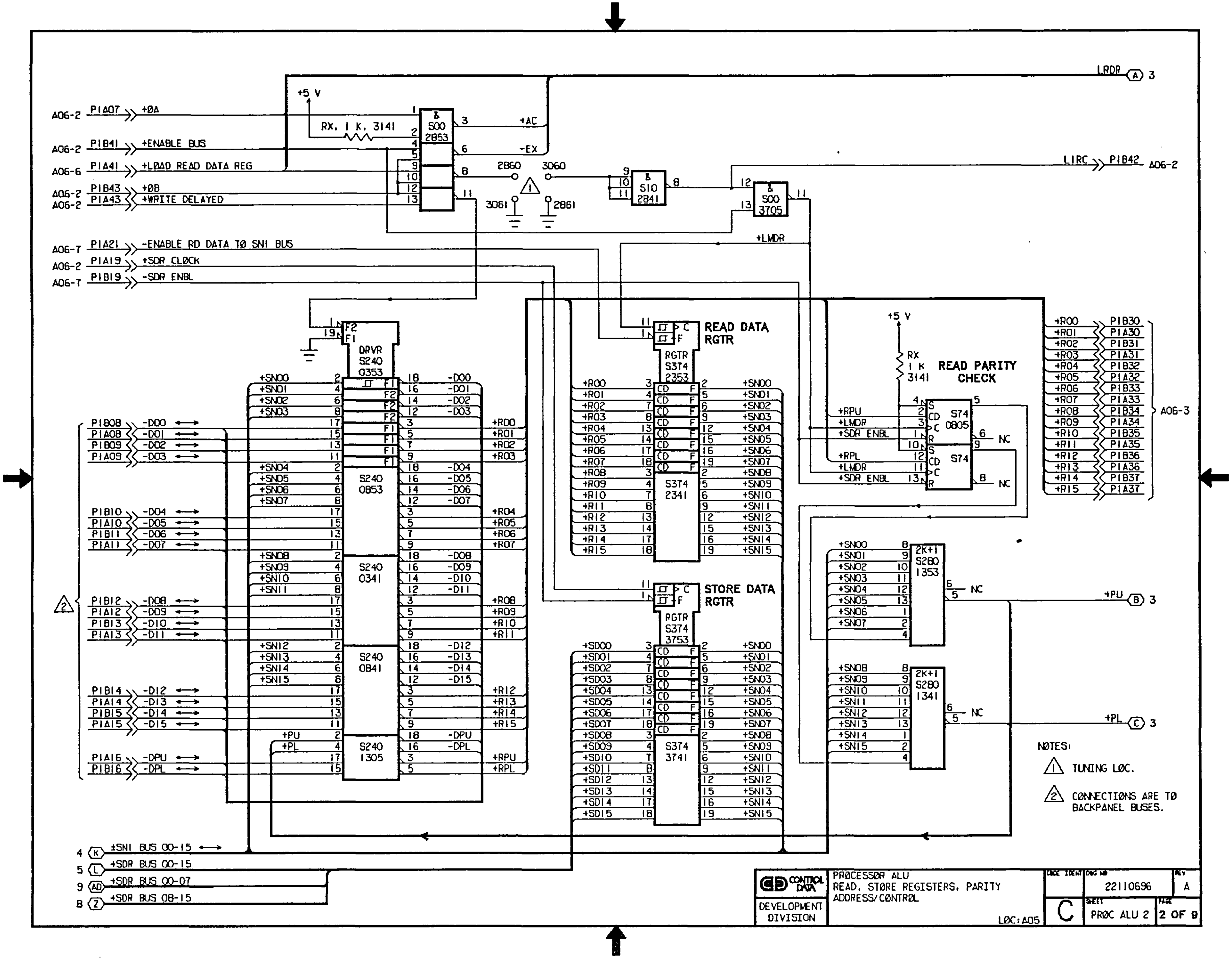

NOTES:

1. TUNING LOC.
2. CONNECTIONS ARE TO BACKPANEL BUSES.

CONTROL DATA DEVELOPMENT DIVISION	PROCESSOR ALU READ, STORE REGISTERS, PARITY ADDRESS/CONTROL LOC: A05	22110696	A
	C	PROC ALU 2	2 OF 9

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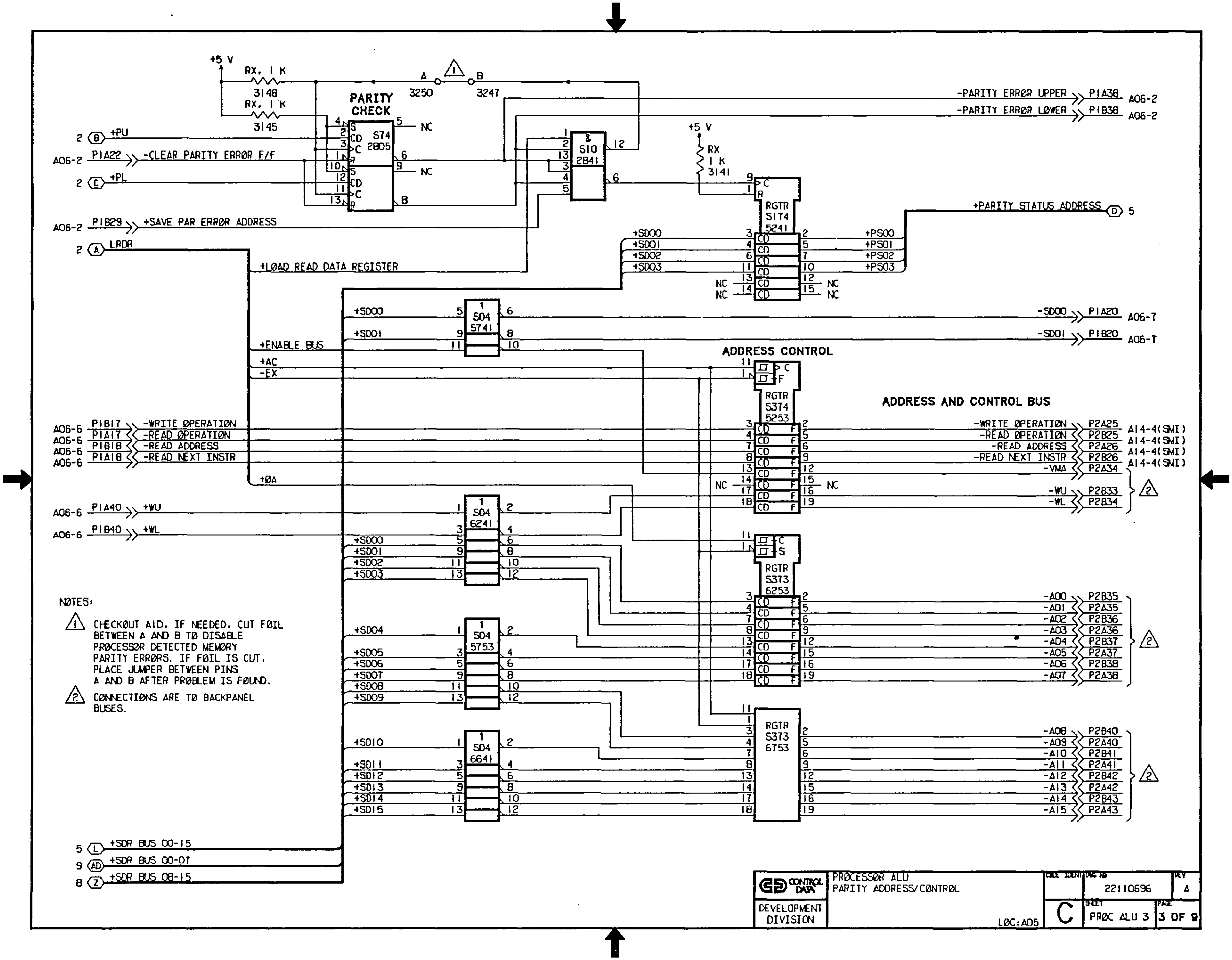

NOTES:

1. CHECKOUT AID. IF NEEDED, CUT FOIL BETWEEN A AND B TO DISABLE PROCESSOR DETECTED MEMORY PARITY ERRORS. IF FOIL IS CUT, PLACE JUMPER BETWEEN PINS A AND B AFTER PROBLEM IS FOUND.
2. CONNECTIONS ARE TO BACKPANEL BUSES.

CONTROL DATA
DEVELOPMENT DIVISION
PROCESSOR ALU
PARITY ADDRESS/CONTROL
LOC: A05
CODE IDENT
C
DWG NO 22110696
REV A
SHEET PROC ALU 3
PAGE 3 OF 9

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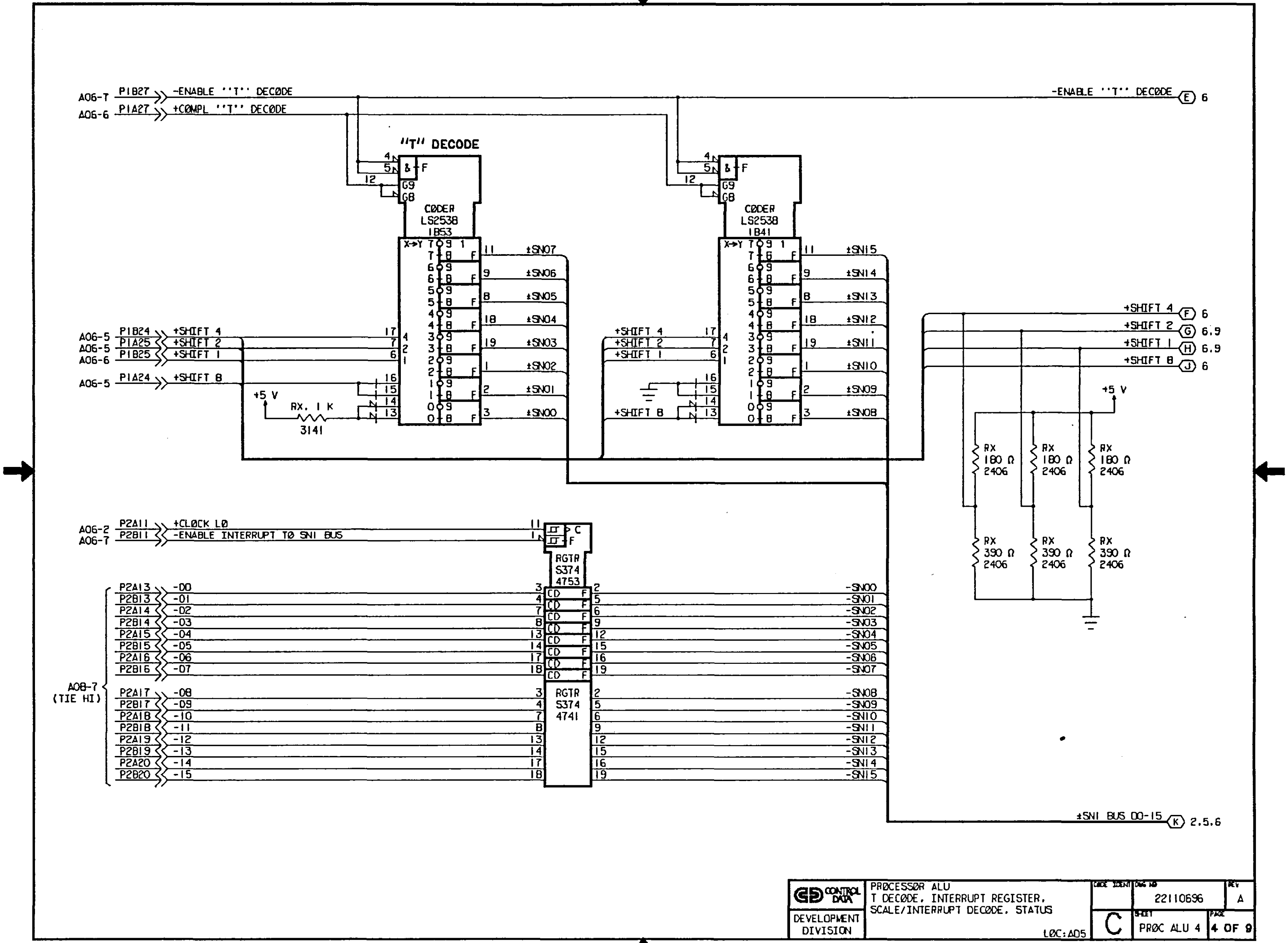

CONTROL DATA

DEVELOPMENT DIVISION

PRØCESSØR ALU
T DECØDE, INTERRUPT REGISTER,
SCALE/INTERRUPT DECØDE, STATUS

LØC:A05

CAGE IDENT C

DWG NO 22110696

REV A

SHEET PRØC ALU 4

PAGE 4 OF 9

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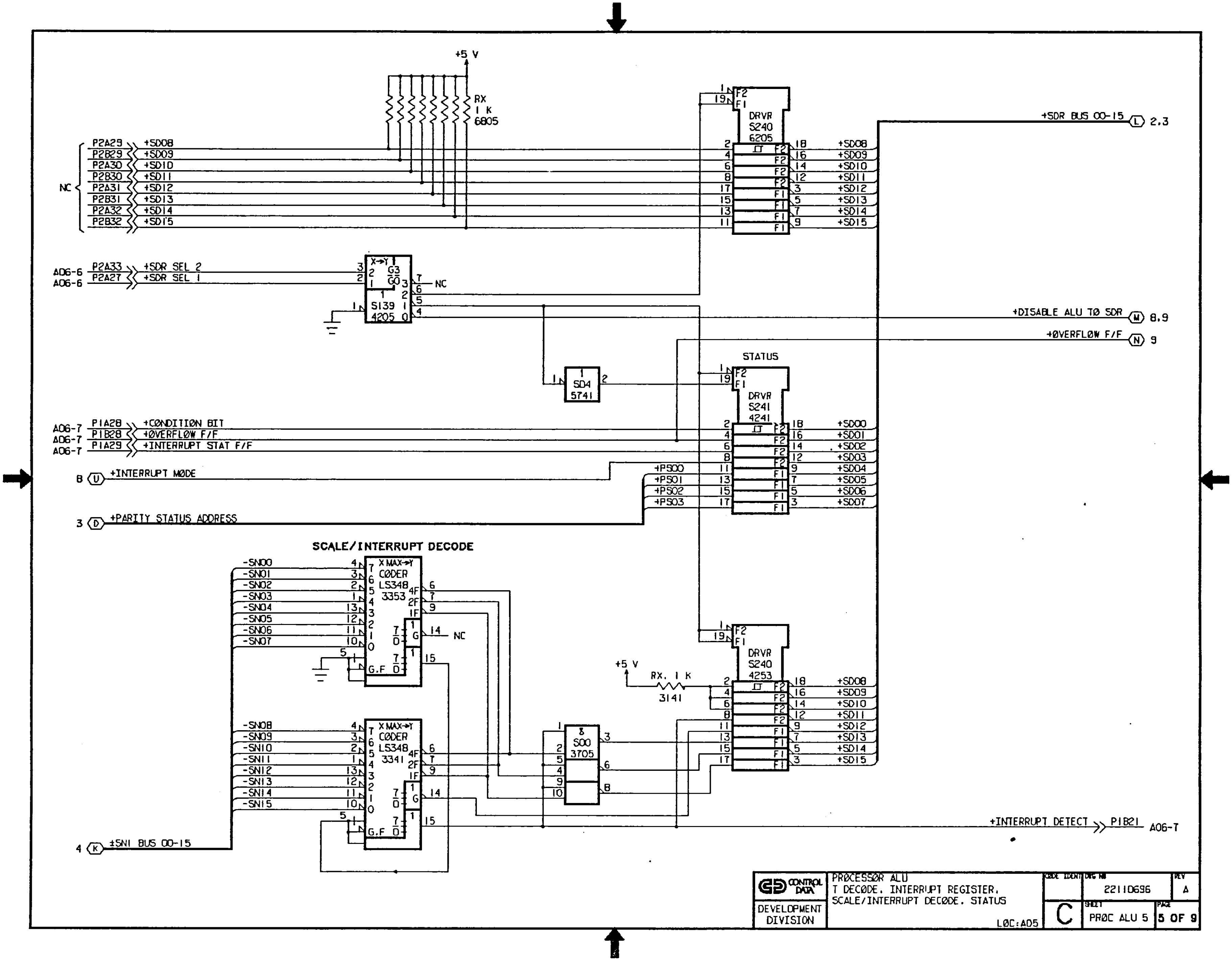
+5 V
RX
1 K
6805
NC
P2A29 +SD08
P2B29 +SD09
P2A30 +SD10
P2B30 +SD11
P2A31 +SD12
P2B31 +SD13
P2A32 +SD14
P2B32 +SD15
DRVR
S240
6205
F2
F1
+SDR BUS 00-15
L 2,3
A06-6 P2A33 +SDR SEL 2
A06-6 P2A27 +SDR SEL 1
X→Y
G3
G0
S139
4205
NC
+DISABLE ALU TO SDR
M 8,9
+OVERFLOW F/F
N 9
STATUS
S04
5741
DRVR
S241
4241
+SD00
+SD01
+SD02
+SD03
+SD04
+SD05
+SD06
+SD07
A06-7 P1A28 +CONDITION BIT
A06-7 P1B28 +OVERFLOW F/F
A06-7 P1A29 +INTERRUPT STAT F/F
8 U +INTERRUPT MODE
+PS00
+PS01
+PS02
+PS03
3 D +PARITY STATUS ADDRESS
SCALE/INTERRUPT DECODE
-SN00
-SN01
-SN02
-SN03
-SN04
-SN05
-SN06
-SN07
X MAX→Y
CODER
LS348
3353
4F
2F
1F
G
G.F
NC
+5 V
RX, 1 K
3141
DRVR
S240
4253
-SN08
-SN09
-SN10
-SN11
-SN12
-SN13
-SN14
-SN15
X MAX→Y
CODER
LS348
3341
&
S00
3705
+INTERRUPT DETECT P1B21 A06-T
4 K ±SNI BUS 00-15
CONTROL DATA
DEVELOPMENT DIVISION
PROCESSOR ALU
T DECODE, INTERRUPT REGISTER,
SCALE/INTERRUPT DECODE, STATUS
LOC:A05
CODE IDENT
DWG NO 22110696
REV A
C
SHEET PROC ALU 5
PAGE 5 OF 9

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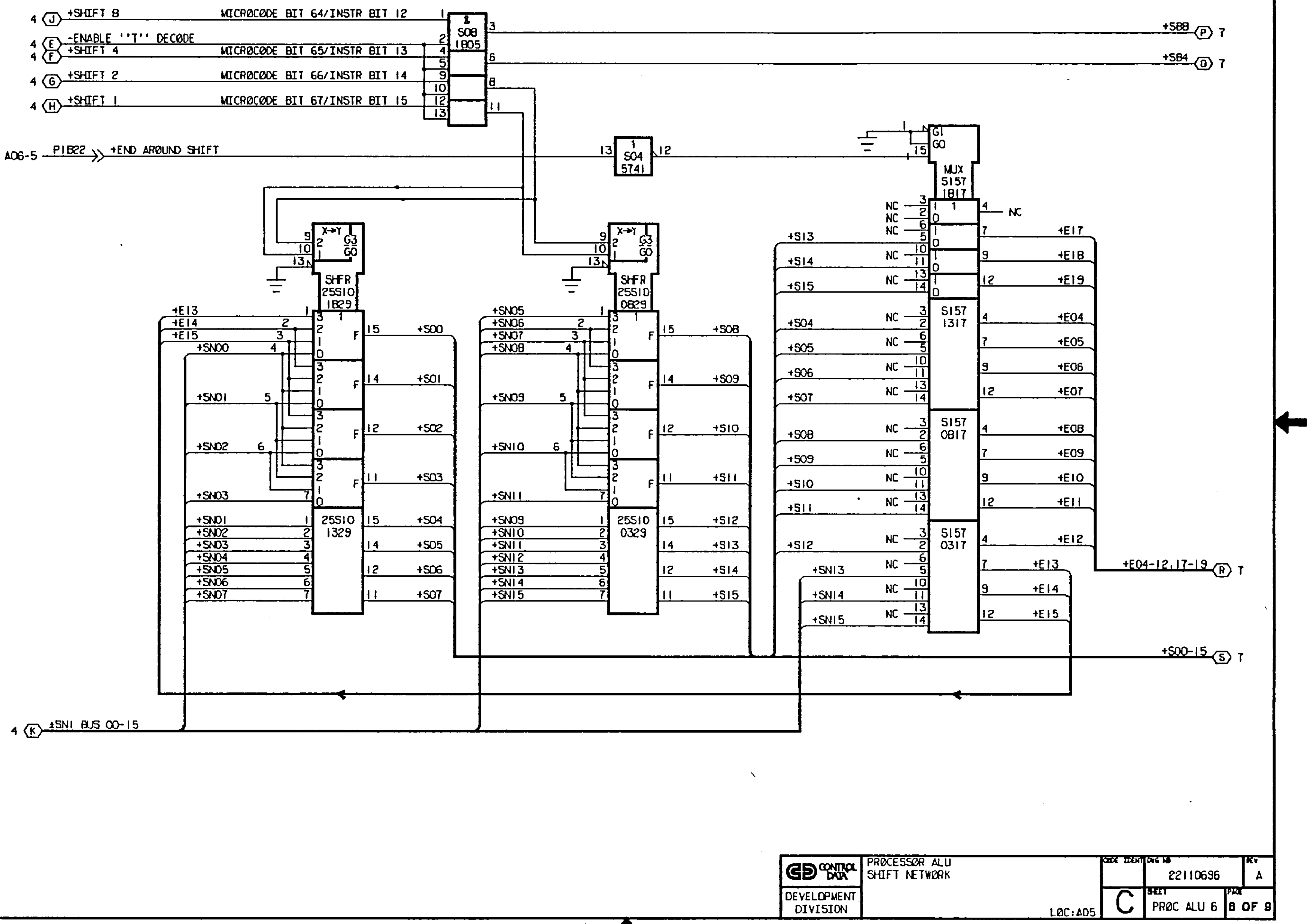

CONTROL DATA
DEVELOPMENT DIVISION

PRØCESSØR ALU
SHIFT NETWØRK

LØC:A05

DWG NO 22110696
REV A
C
SHEET PRØC ALU 6
PAGE 8 OF 9

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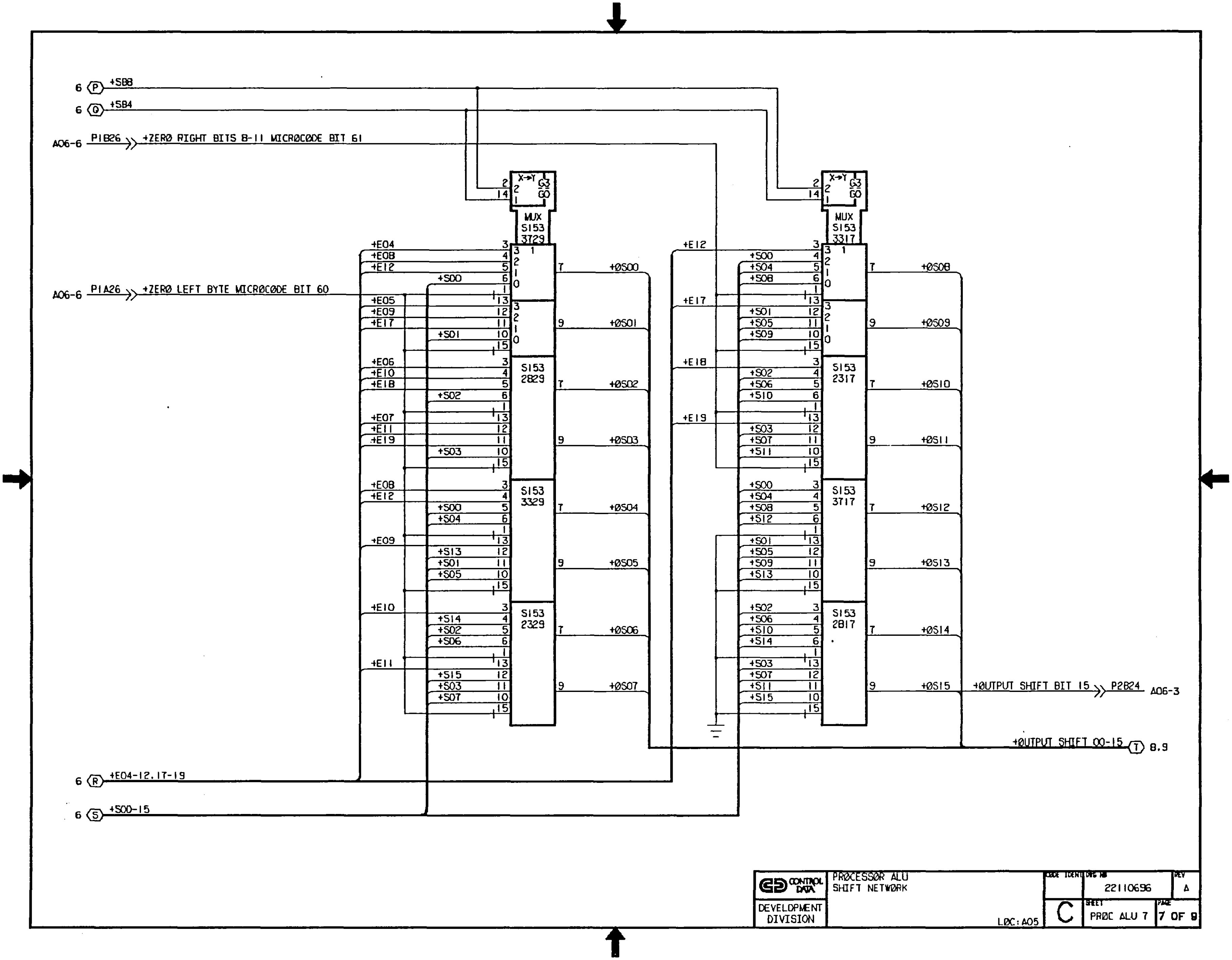

CONTROL DATA

DEVELOPMENT DIVISION

PRØCESSØR ALU
SHIFT NETWØRK

LØC: A05

CODE IDENT

DWG NO 22110696

REV A

C

SHEET PRØC ALU 7

PAGE 7 OF 9

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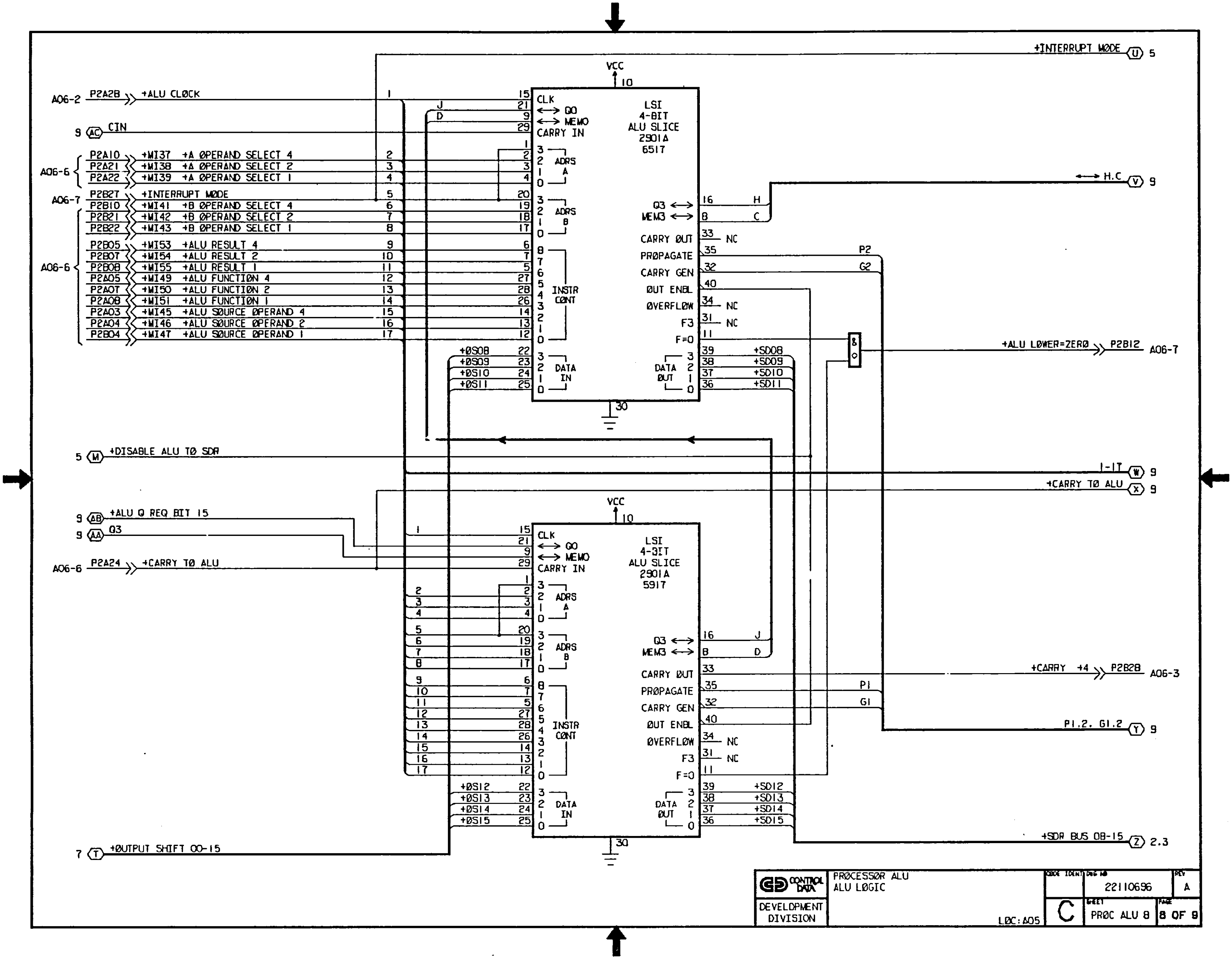
A06-2 P2A28 +ALU CLOCK
9 AC CIN
A06-6 P2A10 +MI37 +A OPERAND SELECT 4
P2A21 +MI38 +A OPERAND SELECT 2
P2A22 +MI39 +A OPERAND SELECT 1
A06-7 P2B27 +INTERRUPT MODE
P2B10 +MI41 +B OPERAND SELECT 4
P2B21 +MI42 +B OPERAND SELECT 2
P2B22 +MI43 +B OPERAND SELECT 1
A06-6
P2B05 +MI53 +ALU RESULT 4
P2B07 +MI54 +ALU RESULT 2
P2B08 +MI55 +ALU RESULT 1
P2A05 +MI49 +ALU FUNCTION 4
P2A07 +MI50 +ALU FUNCTION 2
P2A08 +MI51 +ALU FUNCTION 1
P2A03 +MI45 +ALU SOURCE OPERAND 4
P2A04 +MI46 +ALU SOURCE OPERAND 2
P2B04 +MI47 +ALU SOURCE OPERAND 1
VCC
10
CLK
Q0
MEMO
CARRY IN
ADRS A
ADRS B
INSTR CONT
DATA IN
DATA OUT
LSI 4-BIT ALU SLICE 2901A 6517
Q3
MEM3
CARRY OUT
PROPAGATE
CARRY GEN
OUT ENBL
OVERFLOW
F3
F=0
NC
30
+0S08
+0S09
+0S10
+0S11
+SD08
+SD09
+SD10
+SD11
H
C
P2
G2
&
+INTERRUPT MODE U 5
H.C V 9
+ALU LOWER=ZERO P2B12 A06-7
5 M +DISABLE ALU TO SDR
I-IT W 9
+CARRY TO ALU X 9
9 AB +ALU Q REQ BIT 15
9 AA Q3
A06-6 P2A24 +CARRY TO ALU
LSI 4-BIT ALU SLICE 2901A 5917
J
D
+CARRY +4 P2B28 A06-3
P1
G1
P1.2. G1.2 Y 9
+0S12
+0S13
+0S14
+0S15
+SD12
+SD13
+SD14
+SD15
+SDR BUS 08-15 Z 2.3
7 T +OUTPUT SHIFT 00-15

CONTROL DATA
DEVELOPMENT DIVISION

PROCESSOR ALU
ALU LOGIC

LOC: A05

CODE IDENT | DWG NO 22110696 | REV A

C | SHEET PROC ALU 8 | PAGE 8 OF 9

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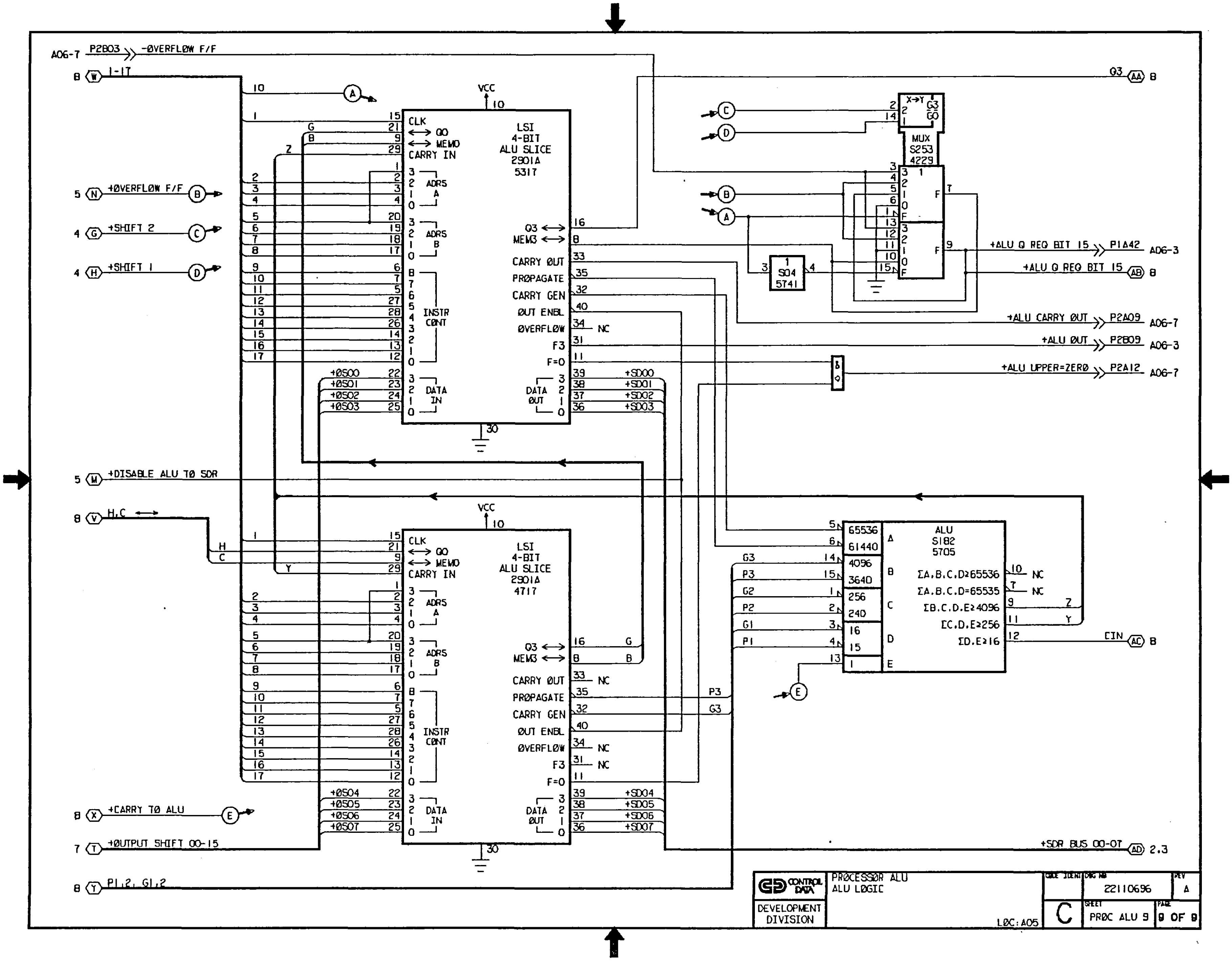

CONTROL DATA

DEVELOPMENT DIVISION

PR0CESS0R ALU
ALU L0GIC

L0C: A05

DWG NO 22110696

REV A

C

SHEET PR0C ALU 9

PAGE 9 OF 9

Processor Control (A06)

The processor control logic processes all instructions of processor ALU, (A05). For details of operation, including the internal instruction set of the processor, refer to appendix B of the CYBER Channel Coupler FR205-A/B, FV720-A/B Hardware Reference Manual (publication number 60459170).

The revision levels for the Processor Control diagrams are shown on the facing page (A06-1).

PAGE							REVISION RECORD					
7	6	5	4	3	2	1	ECO	DESCRIPTION	DRFT	DATE	CHKD	APVD
A	A	A	A	A	A	A		CLASS A RELEASE	MES	02/88	KMS	KMS

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DETACHED LISTS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN
TOLERANCES
PLACE ± PLACE ± ANGLES ±
MATERIAL
FINISH

DWN	M E SCHMIDT	02/88
CHKD	K M STARIHA	02/88
ENGR	M R KAISER	02/88
MFG		
APVD	L B ULFIG	02/88

EQUIP. NO. FR205-B

THIRD ANGLE PROJECTION

CONTROL DATA

ARDEN HILLS OPERATIONS
ST. PAUL, MINN.

TITLE

LOGIC DIAGRAM PROCESSOR CONTROL

PWA-10292489 PWB-52803440

SIZE C	FSCM NO. 34010	DWG NO. 10292490
LOC: A06	SHEET PROC CONT 18	PAGE 1 OF 7

CALMA

CSIZECOVER2

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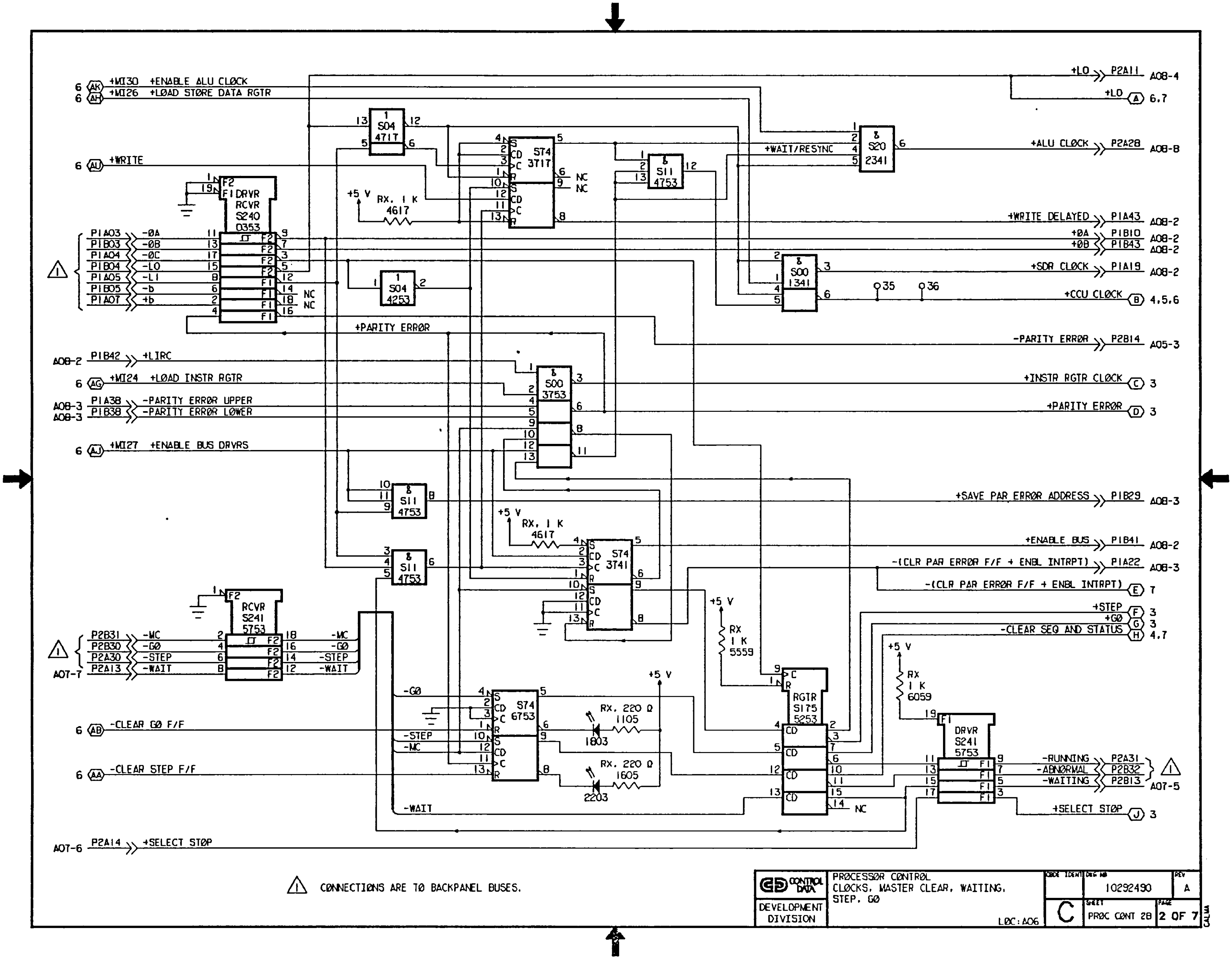

⚠ CONNECTIONS ARE TO BACKPANEL BUSES.

CONTROL DATA

DEVELOPMENT DIVISION

PROCESSOR CONTROL
CLOCKS, MASTER CLEAR, WAITING,
STEP, GO

LOC: A06

CODE IDENT	DWG NO	REV
C	10292490	A
SHEET	PROC CONT 2B	PAGE 2 OF 7

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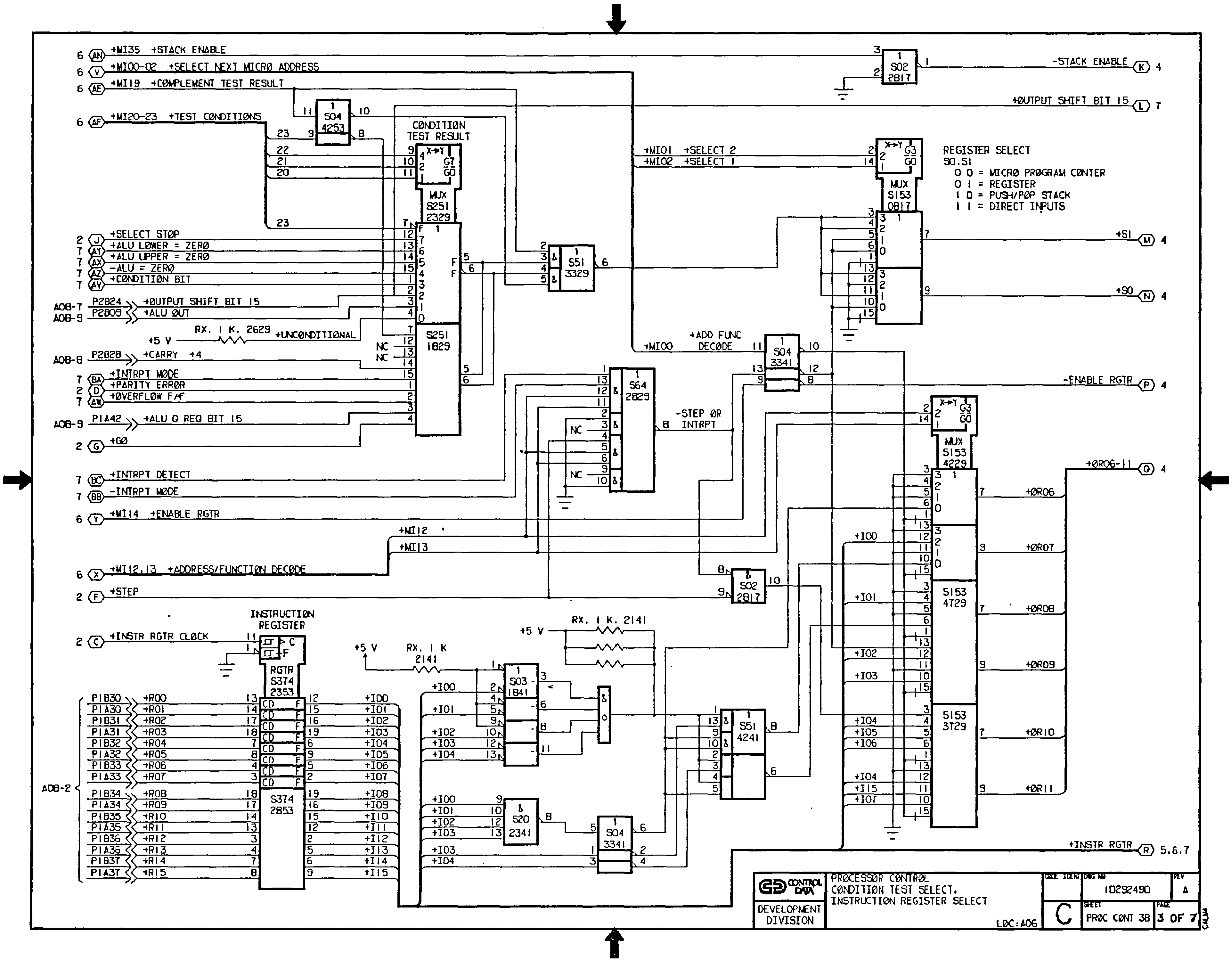

CONTROL DATA

DEVELOPMENT DIVISION

PROCESSOR CONTROL
CONDITION TEST SELECT,
INSTRUCTION REGISTER SELECT

LOC: A06

DWG NO 10292490

REV A

C

SHEET PROC CONT 38

PAGE 3 OF 7

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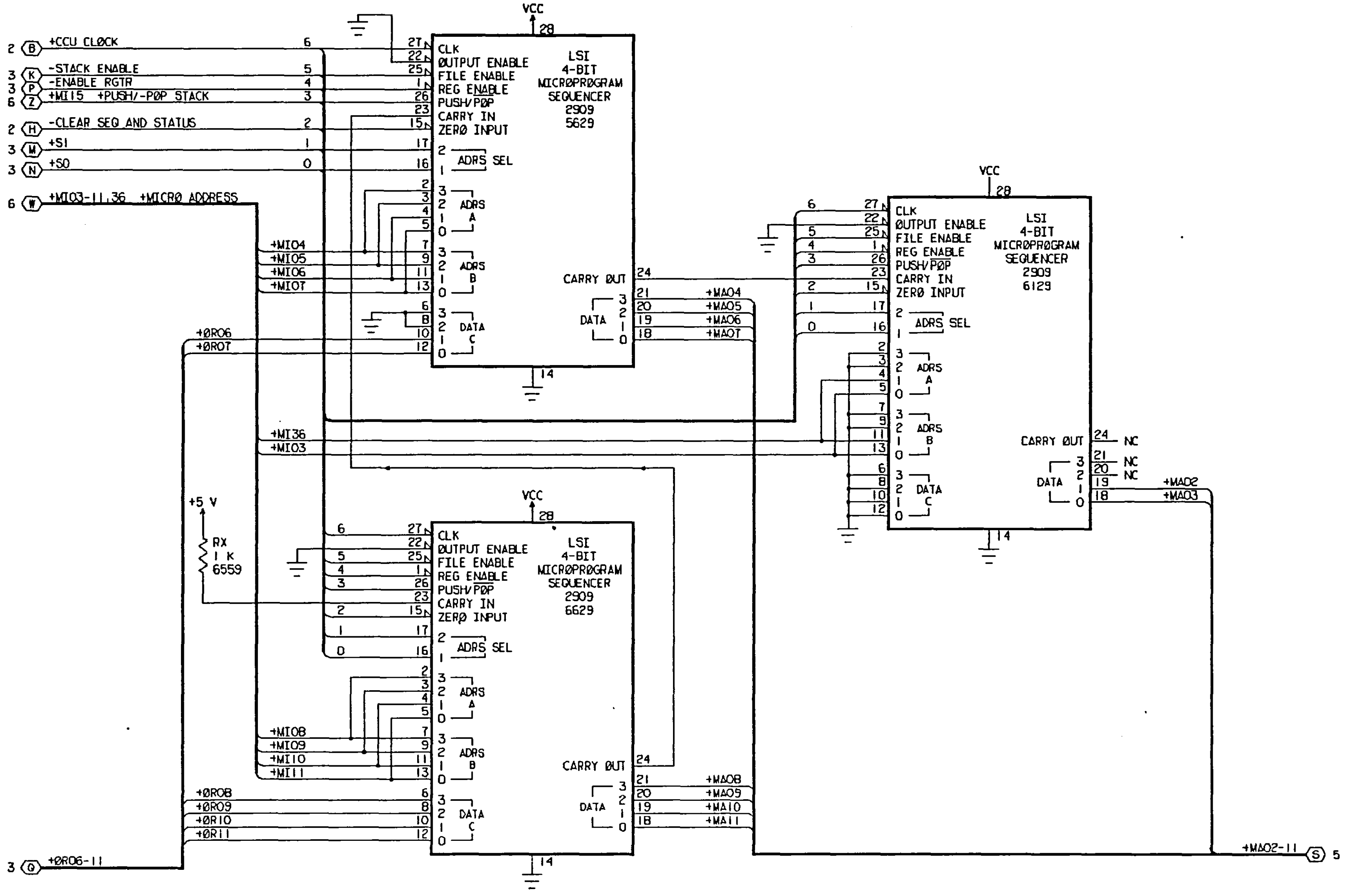

CONTROL DATA	PROCESSOR CONTROL MICRO SEQUENCER	CODE IDENT	DWG NO 10292490	REV A
DEVELOPMENT DIVISION	LOC:A06	C	SHEET PROC CONT 4B	PAGE 4 OF 7

CALMA

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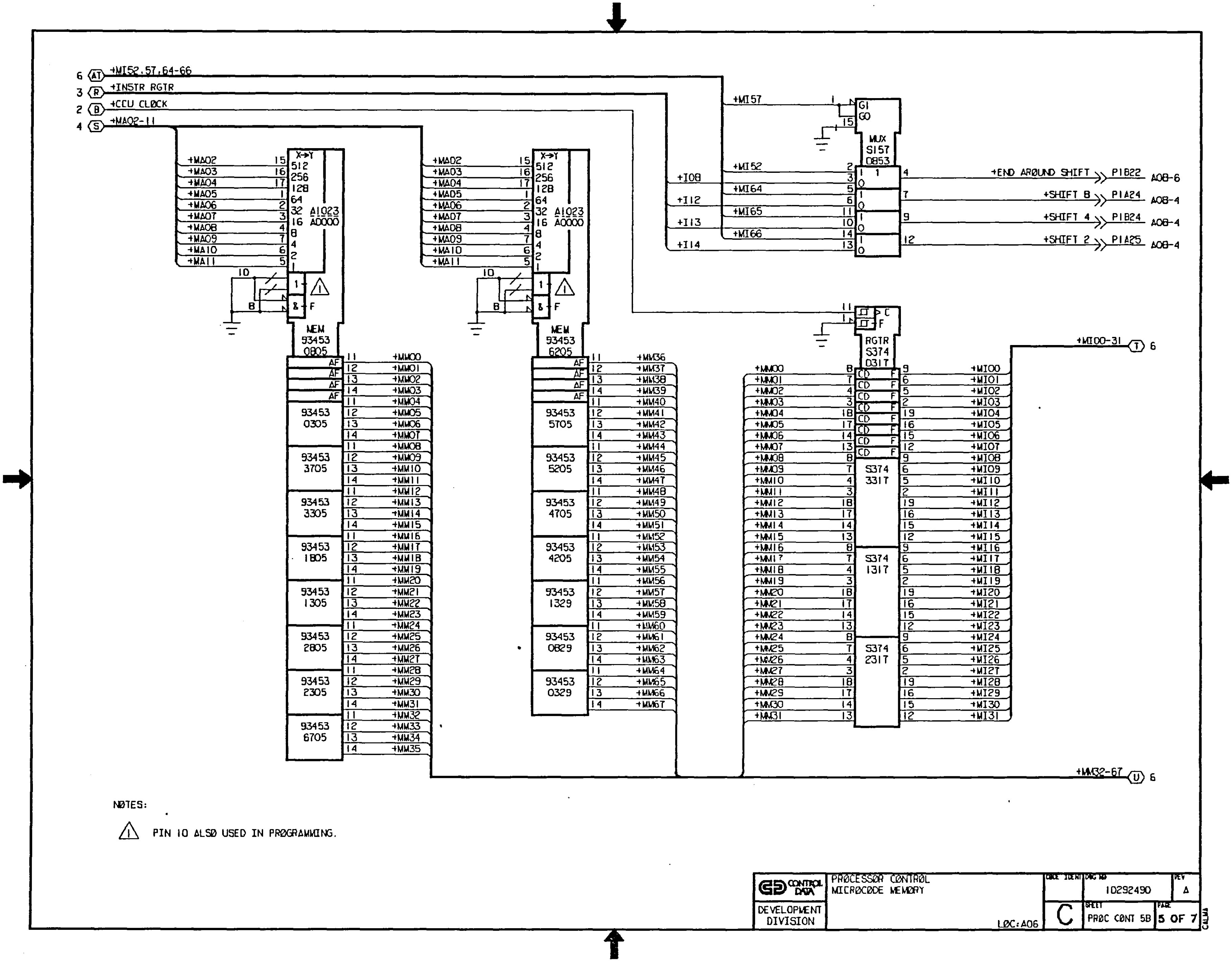
6 AT +MI52,57,64-66
3 R +INSTR RGTR
2 B +CCU CLOCK
4 S +MA02-11
+MA02 15
+MA03 16
+MA04 17
+MA05 1
+MA06 2
+MA07 3
+MA08 4
+MA09 7
+MA10 6
+MA11 5
X→Y
512
256
128
64
32
16
8
4
2
1
A1023
A0000
10
B
1
&
F
MEM 93453 0805
AF
93453 0305
93453 3705
93453 3305
93453 1805
93453 1305
93453 2805
93453 2305
93453 6705
+MM00
+MM01
+MM02
+MM03
+MM04
+MM05
+MM06
+MM07
+MM08
+MM09
+MM10
+MM11
+MM12
+MM13
+MM14
+MM15
+MM16
+MM17
+MM18
+MM19
+MM20
+MM21
+MM22
+MM23
+MM24
+MM25
+MM26
+MM27
+MM28
+MM29
+MM30
+MM31
+MM32
+MM33
+MM34
+MM35
MEM 93453 6205
93453 5705
93453 5205
93453 4705
93453 4205
93453 1329
93453 0829
93453 0329
+MM36
+MM37
+MM38
+MM39
+MM40
+MM41
+MM42
+MM43
+MM44
+MM45
+MM46
+MM47
+MM48
+MM49
+MM50
+MM51
+MM52
+MM53
+MM54
+MM55
+MM56
+MM57
+MM58
+MM59
+MM60
+MM61
+MM62
+MM63
+MM64
+MM65
+MM66
+MM67
+MI57
+MI52
+MI64
+MI65
+MI66
+I08
+I12
+I13
+I14
G1
G0
MUX S157 0853
+END AROUND SHIFT P1B22 A08-6
+SHIFT 8 P1A24 A08-4
+SHIFT 4 P1B24 A08-4
+SHIFT 2 P1A25 A08-4
C
F
RGTR S374 0317
CD F
S374 3317
S374 1317
S374 2317
+MI00
+MI01
+MI02
+MI03
+MI04
+MI05
+MI06
+MI07
+MI08
+MI09
+MI10
+MI11
+MI12
+MI13
+MI14
+MI15
+MI16
+MI17
+MI18
+MI19
+MI20
+MI21
+MI22
+MI23
+MI24
+MI25
+MI26
+MI27
+MI28
+MI29
+MI30
+MI31
+MI00-31 T 6
+MM32-67 U 6
NOTES:
1 PIN 10 ALSO USED IN PROGRAMMING.
CONTROL DATA
DEVELOPMENT DIVISION
PROCESSOR CONTROL
MICROCODE MEMORY
LOC: A06
C
10292490
A
PROC CONT 5B
5 OF 7

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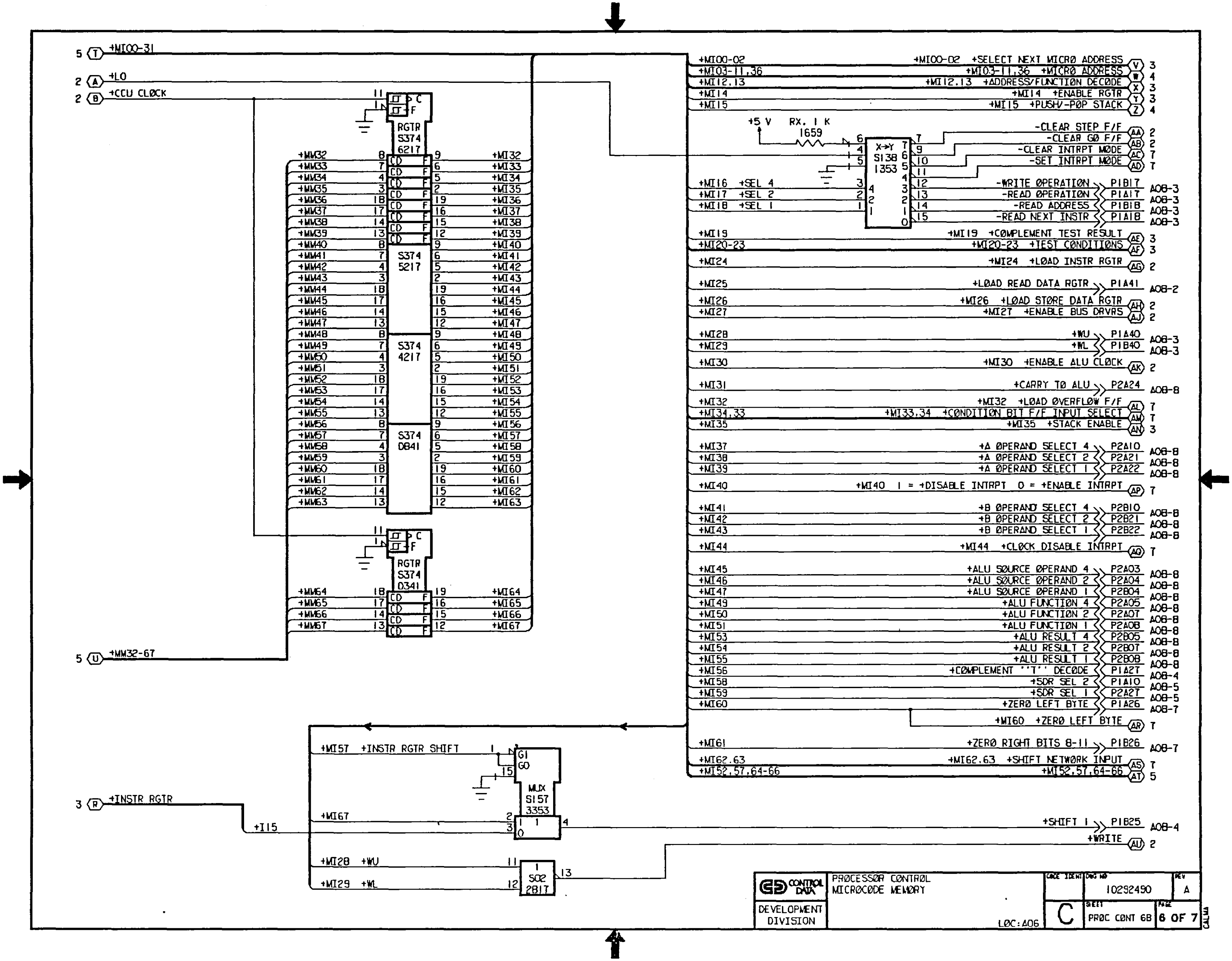
5 T +MI00-31
2 A +LO
2 B +CCU CLØCK
RGTR S374 6217
S374 5217
S374 4217
S374 D841
RGTR S374 D341
+MM32 … +MM67
+MI32 … +MI67
5 U +MM32-67
+MI00-02 +MI00-02 +SELECT NEXT MICRØ ADDRESS V 3
+MI03-11,36 +MI03-11,36 +MICRØ ADDRESS W 4
+MI12,13 +MI12,13 +ADDRESS/FUNCTIØN DECØDE X 3
+MI14 +MI14 +ENABLE RGTR Y 3
+MI15 +MI15 +PUSH/-PØP STACK Z 4
+5 V RX. 1 K 1659
X→Y S138 1353
-CLEAR STEP F/F AA 2
-CLEAR GØ F/F AB 2
-CLEAR INTRPT MØDE AC 7
-SET INTRPT MØDE AD 7
+MI16 +SEL 4
+MI17 +SEL 2
+MI18 +SEL 1
-WRITE ØPERATIØN P1B17 A08-3
-READ ØPERATIØN P1A17 A08-3
-READ ADDRESS P1B18 A08-3
-READ NEXT INSTR P1A18 A08-3
+MI19 +MI19 +CØMPLEMENT TEST RESULT AE 3
+MI20-23 +MI20-23 +TEST CØNDITIØNS AF 3
+MI24 +MI24 +LØAD INSTR RGTR AG 2
+MI25 +LØAD READ DATA RGTR P1A41 A08-2
+MI26 +MI26 +LØAD STØRE DATA RGTR AH 2
+MI27 +MI27 +ENABLE BUS DRVRS AJ 2
+MI28 +WU P1A40 A08-3
+MI29 +WL P1B40 A08-3
+MI30 +MI30 +ENABLE ALU CLØCK AK 2
+MI31 +CARRY TØ ALU P2A24 A08-8
+MI32 +MI32 +LØAD ØVERFLØW F/F AL 7
+MI34,33 +MI33,34 +CØNDITIØN BIT F/F INPUT SELECT AM 7
+MI35 +MI35 +STACK ENABLE AN 3
+MI37 +A ØPERAND SELECT 4 P2A10 A08-8
+MI38 +A ØPERAND SELECT 2 P2A21 A08-8
+MI39 +A ØPERAND SELECT 1 P2A22 A08-8
+MI40 +MI40 1 = +DISABLE INTRPT 0 = +ENABLE INTRPT AP 7
+MI41 +B ØPERAND SELECT 4 P2B10 A08-8
+MI42 +B ØPERAND SELECT 2 P2B21 A08-8
+MI43 +B ØPERAND SELECT 1 P2B22 A08-8
+MI44 +MI44 +CLØCK DISABLE INTRPT AQ 7
+MI45 +ALU SØURCE ØPERAND 4 P2A03 A08-8
+MI46 +ALU SØURCE ØPERAND 2 P2A04 A08-8
+MI47 +ALU SØURCE ØPERAND 1 P2B04 A08-8
+MI49 +ALU FUNCTIØN 4 P2A05 A08-8
+MI50 +ALU FUNCTIØN 2 P2A07 A08-8
+MI51 +ALU FUNCTIØN 1 P2A08 A08-8
+MI53 +ALU RESULT 4 P2B05 A08-8
+MI54 +ALU RESULT 2 P2B07 A08-8
+MI55 +ALU RESULT 1 P2B08 A08-8
+MI56 +CØMPLEMENT ''T'' DECØDE P1A27 A08-4
+MI58 +SDR SEL 2 P1A10 A08-5
+MI59 +SDR SEL 1 P2A27 A08-5
+MI60 +ZERØ LEFT BYTE P1A26 A08-7
+MI60 +ZERØ LEFT BYTE AR 7
+MI61 +ZERØ RIGHT BITS 8-11 P1B26 A08-7
+MI62,63 +MI62,63 +SHIFT NETWØRK INPUT AS 7
+MI52,57,64-66 +MI52,57,64-66 AT 5
+MI57 +INSTR RGTR SHIFT
MUX S157 3353
3 R +INSTR RGTR
+I15
+MI67
+SHIFT 1 P1B25 A08-4
+WRITE AU 2
+MI28 +WU
+MI29 +WL
S02 2B17
CONTROL DATA
DEVELOPMENT DIVISION
PRØCESSØR CØNTRØL MICRØCØDE MEMØRY
LØC:A06
C
10292490
A
PRØC CØNT 6B
6 OF 7

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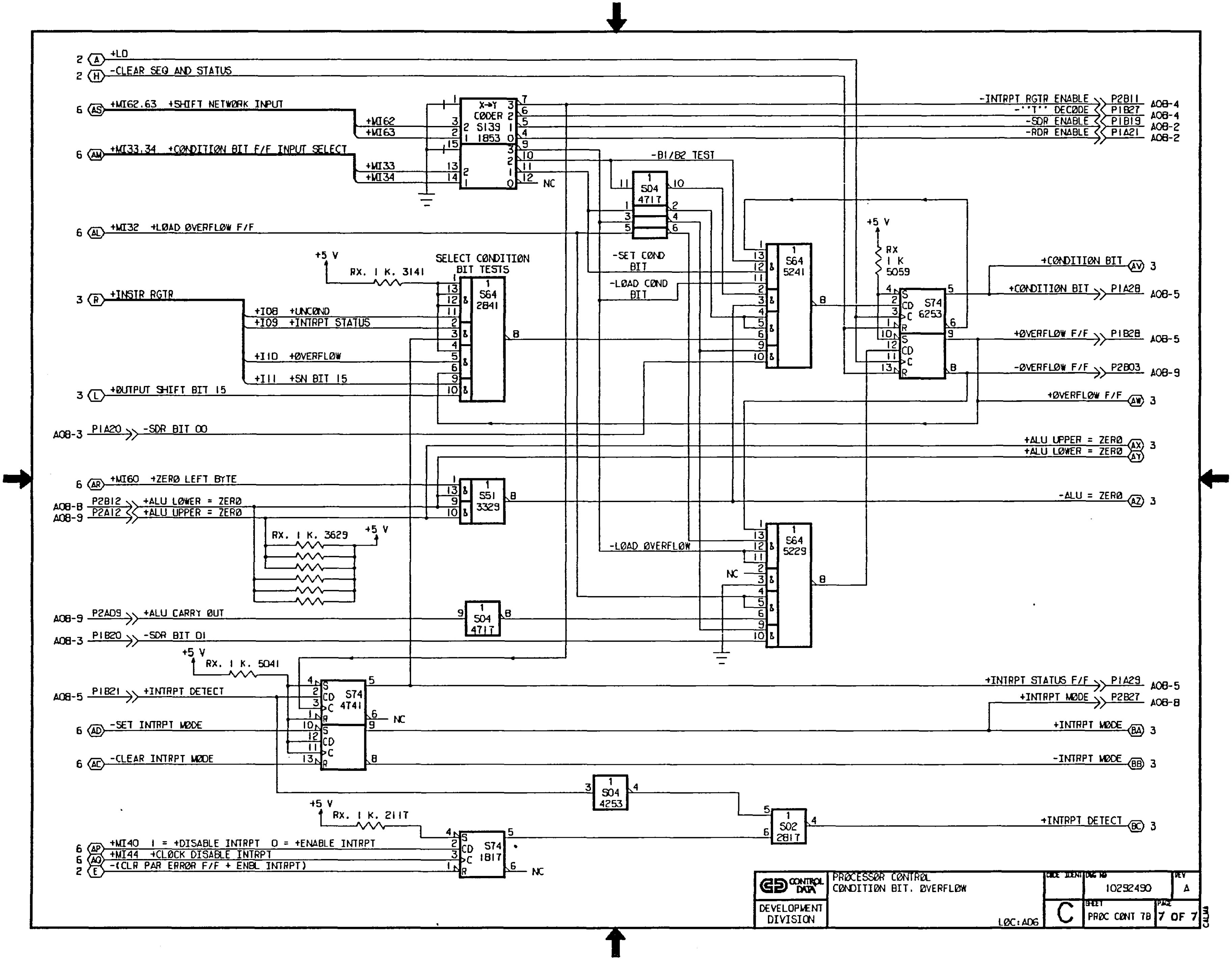

2 A +LD
2 H -CLEAR SEQ AND STATUS
6 AS +MI62.63 +SHIFT NETWORK INPUT
+MI62
+MI63
6 AM +MI33.34 +CONDITION BIT F/F INPUT SELECT
+MI33
+MI34
X→Y CODER S139 1853
NC
-INTRPT RGTR ENABLE P2B11 A08-4
-"T" DECODE P1B27 A08-4
-SDR ENABLE P1B19 A08-2
-RDR ENABLE P1A21 A08-2
-B1/B2 TEST
S04 4717
6 AL +MI32 +LOAD OVERFLOW F/F
-SET COND BIT
-LOAD COND BIT
S64 5241
+5 V
RX 1 K 5059
S74 6253
+CONDITION BIT AV 3
+CONDITION BIT P1A28 A08-5
+OVERFLOW F/F P1B28 A08-5
-OVERFLOW F/F P2B03 A08-9
+OVERFLOW F/F AW 3
+5 V
RX. 1 K. 3141
SELECT CONDITION BIT TESTS
S64 2841
3 R +INSTR RGTR
+I08 +UNCOND
+I09 +INTRPT STATUS
+I10 +OVERFLOW
+I11 +SN BIT 15
3 L +OUTPUT SHIFT BIT 15
A08-3 P1A20 -SDR BIT 00
+ALU UPPER = ZERO AX 3
+ALU LOWER = ZERO AY
6 AR +MI60 +ZERO LEFT BYTE
A08-8 P2B12 +ALU LOWER = ZERO
A08-9 P2A12 +ALU UPPER = ZERO
S51 3329
-ALU = ZERO AZ 3
RX. 1 K. 3629
+5 V
-LOAD OVERFLOW
S64 5229
NC
A08-9 P2A09 +ALU CARRY OUT
S04 4717
A08-3 P1B20 -SDR BIT 01
+5 V
RX. 1 K. 5041
S74 4741
A08-5 P1B21 +INTRPT DETECT
6 AD -SET INTRPT MODE
6 AC -CLEAR INTRPT MODE
NC
+INTRPT STATUS F/F P1A29 A08-5
+INTRPT MODE P2B27 A08-8
+INTRPT MODE BA 3
-INTRPT MODE BB 3
S04 4253
S02 2817
+INTRPT DETECT BC 3
+5 V
RX. 1 K. 2117
S74 1817
6 AP +MI40 1 = +DISABLE INTRPT 0 = +ENABLE INTRPT
6 AQ +MI44 +CLOCK DISABLE INTRPT
2 E -(CLR PAR ERROR F/F + ENBL INTRPT)
NC
CONTROL DATA
DEVELOPMENT DIVISION
PROCESSOR CONTROL
CONDITION BIT, OVERFLOW
LOC:A06
10292490
A
C
PROC CONT 7B
7 OF 7

RAM_ROM (A07)

The Memory 65K PROM revision levels for the RAM_ROM diagrams are shown on the facing page (A07-1).

PAGE								REVISION RECORD					
8	7	6	5	4	3	2	1	ECO	DESCRIPTION	DRFT	DATE	CHKD	APVD
A	A	A	A	A	A	A	A		CLASS A RELEASED	GRH	5/19/87	GRH	GRH
B	A	A	A	A	A	A	B	CA 49142 A	REVERSED POLARITY ON LED	GRH	8/20/87	GRH	GRH
B	A	A	A	A	A	A	C	CA 49315 A	ADD PWA/PWB * TO TITLE BLK	GRH	4/22/88	GRH	GRH

⚠1 THIS DOCUMENT IS CONTAINED ON MAGNETIC TAPE. MAGNETIC TAPE IS STORED IN THE EDP GROUP OF ENGINEERING SERVICES SECTION,CDED DIVISION

⚠2 UPDATES TO LOGIC PRINTS MUST BE PERFORMED BY PERIPHERAL ENGINEERING GROUP CDED

⚠3 THE OFF SHEET SIGNAL REFERENCES DESIGNATE THE PAGE IN THE TITLE BLOCK AREA ON DIAGRAMS.

DRWN	G R HOOD	5/15/87
CHKD	G R HOOD	5/19/87
ENGR	G R HOOD	5/19/87
APVD	L B ULFIG	5/19/87

EQUIP. NO. FR205-B

TITLE

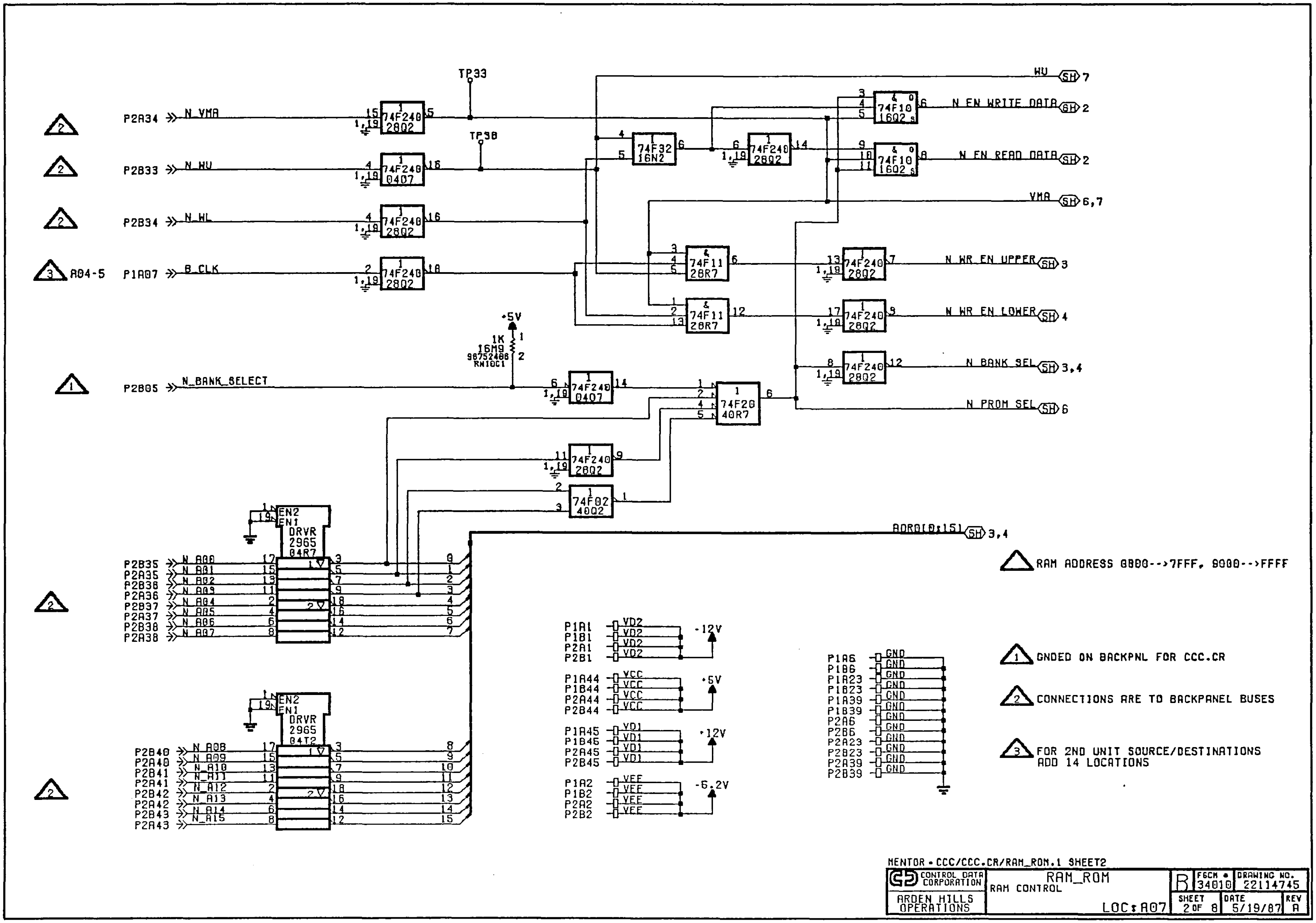
LOGIC DIAGRAM
MEMORY 65K
PROM

PWA 10284353 PWB 22133997

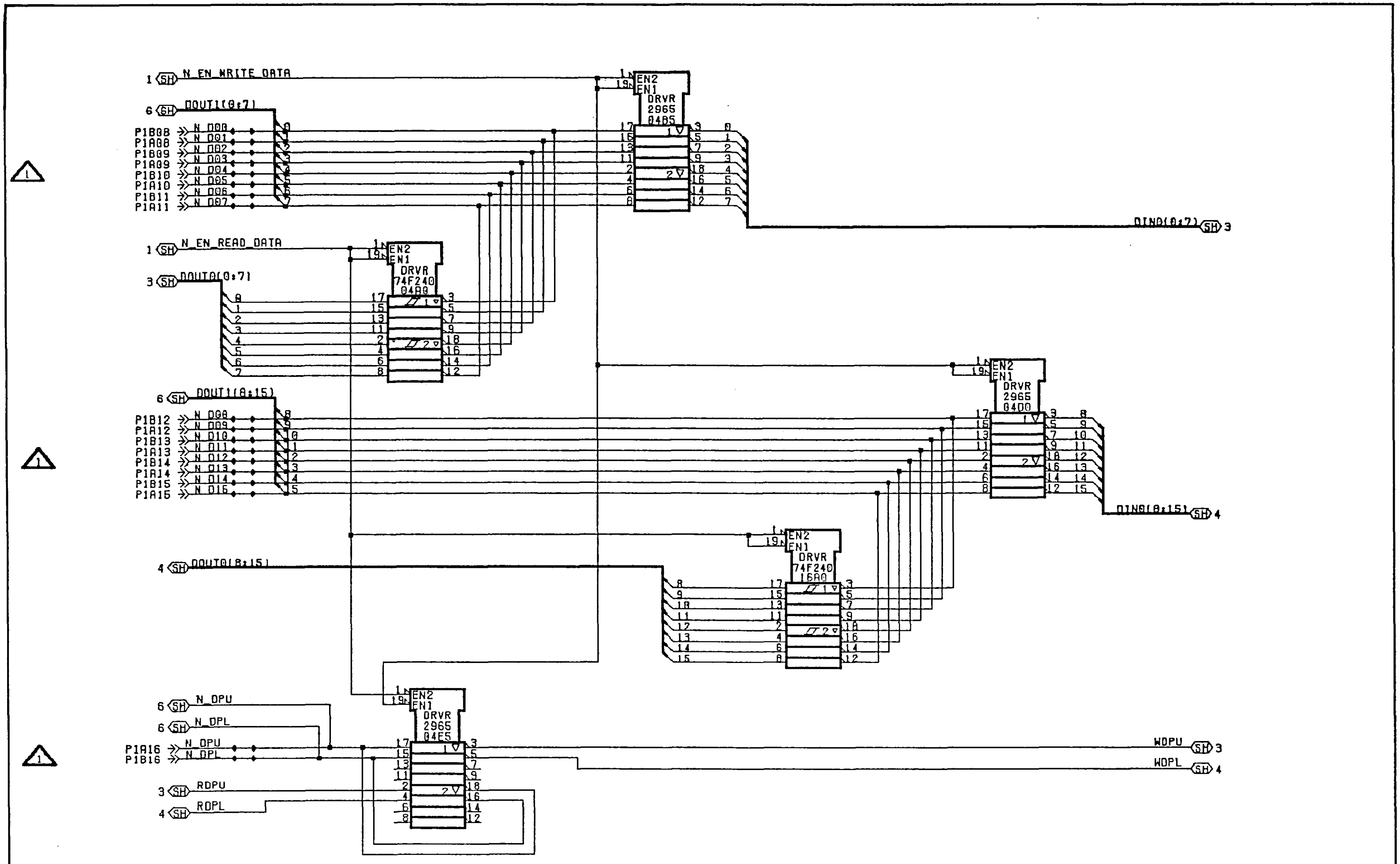
MENTOR • CCC/CCC.CR/RAM_ROM.1_COVER SHEET1

CONTROL DATA CORPORATION ARDEN HILLS OPERATIONS	MEMORY 65K PROM AND TEST LOGIC LOC:A07	B	FSCM • 34010	DRAWING NO. 22114745
		SHEET 1 OF 8	DATE 8/20/87	REV B

To present the information in this chapter in a structured format, this page has been left blank.


TP33
TP38
P2A34 N_VMA
P2B33 N_WU
P2B34 N_WL
P1A07 B_CLK
A04-5
P2B05 N_BANK_SELECT
74F240 2802
74F240 0407
74F32 16N2
74F10 1602
74F11 28R7
74F20 40R7
74F02 4802
+5V
1K 16M9 98752486 RN10C1
WU
N_EN_WRITE_DATA
N_EN_READ_DATA
VMA
N_WR_EN_UPPER
N_WR_EN_LOWER
N_BANK_SEL
N_PROM_SEL
SH 7
SH 2
SH 6,7
SH 3
SH 4
SH 3,4
SH 6
ADRD[0:15]
EN2
EN1
DRVR 2965 04R7
DRVR 2965 04T2
P2B35 N_A00
P2A35 N_A01
P2B36 N_A02
P2A36 N_A03
P2B37 N_A04
P2A37 N_A05
P2B38 N_A06
P2A38 N_A07
P2B40 N_A08
P2A40 N_A09
P2B41 N_A10
P2A41 N_A11
P2B42 N_A12
P2A42 N_A13
P2B43 N_A14
P2A43 N_A15
P1A1 VD2
P1B1 VD2
P2A1 VD2
P2B1 VD2
-12V
P1A44 VCC
P1B44 VCC
P2A44 VCC
P2B44 VCC
+5V
P1A45 VD1
P1B45 VD1
P2A45 VD1
P2B45 VD1
+12V
P1A2 VEE
P1B2 VEE
P2A2 VEE
P2B2 VEE
-5.2V
P1A6 GND
P1B6 GND
P1A23 GND
P1B23 GND
P1A39 GND
P1B39 GND
P2A6 GND
P2B6 GND
P2A23 GND
P2B23 GND
P2A39 GND
P2B39 GND
RAM ADDRESS 0000-->7FFF, 8000-->FFFF
1 GNDED ON BACKPNL FOR CCC.CR
2 CONNECTIONS ARE TO BACKPANEL BUSES
3 FOR 2ND UNIT SOURCE/DESTINATIONS ADD 14 LOCATIONS
MENTOR • CCC/CCC.CR/RAM_ROM.1 SHEET2
CONTROL DATA CORPORATION
ARDEN HILLS OPERATIONS
RAM_ROM
RAM CONTROL
LOC:A07
B
FSCM • 34010
DRAWING NO. 22114745
SHEET 2 OF 8
DATE 5/19/87
REV A

To present the information in this chapter in a structured format, this page has been left blank.

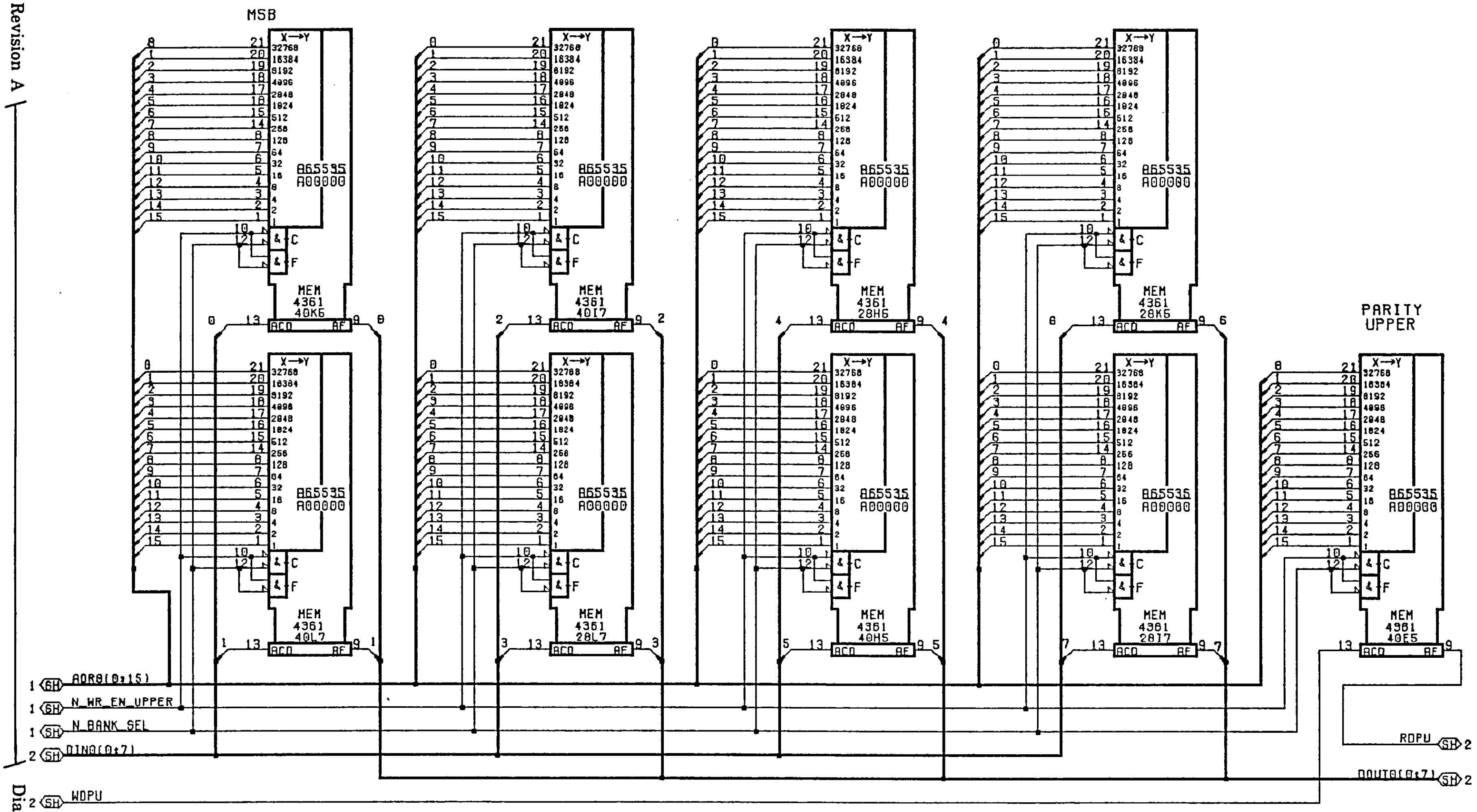


1 CONNECTIONS ARE TO BACKPANEL BUSES

MENTOR • CCC/CCC.CR/RAM_ROM.1 SHEET3

CONTROL DATA CORPORATION	RAM_ROM RAM MEMORY DRIVERS	B	FSCM • 34010	DRAWING NO. 22114745	
ARDEN HILLS OPERATIONS	LOC: A07	SHEET 3 OF 8		DATE 5/19/87	REV A

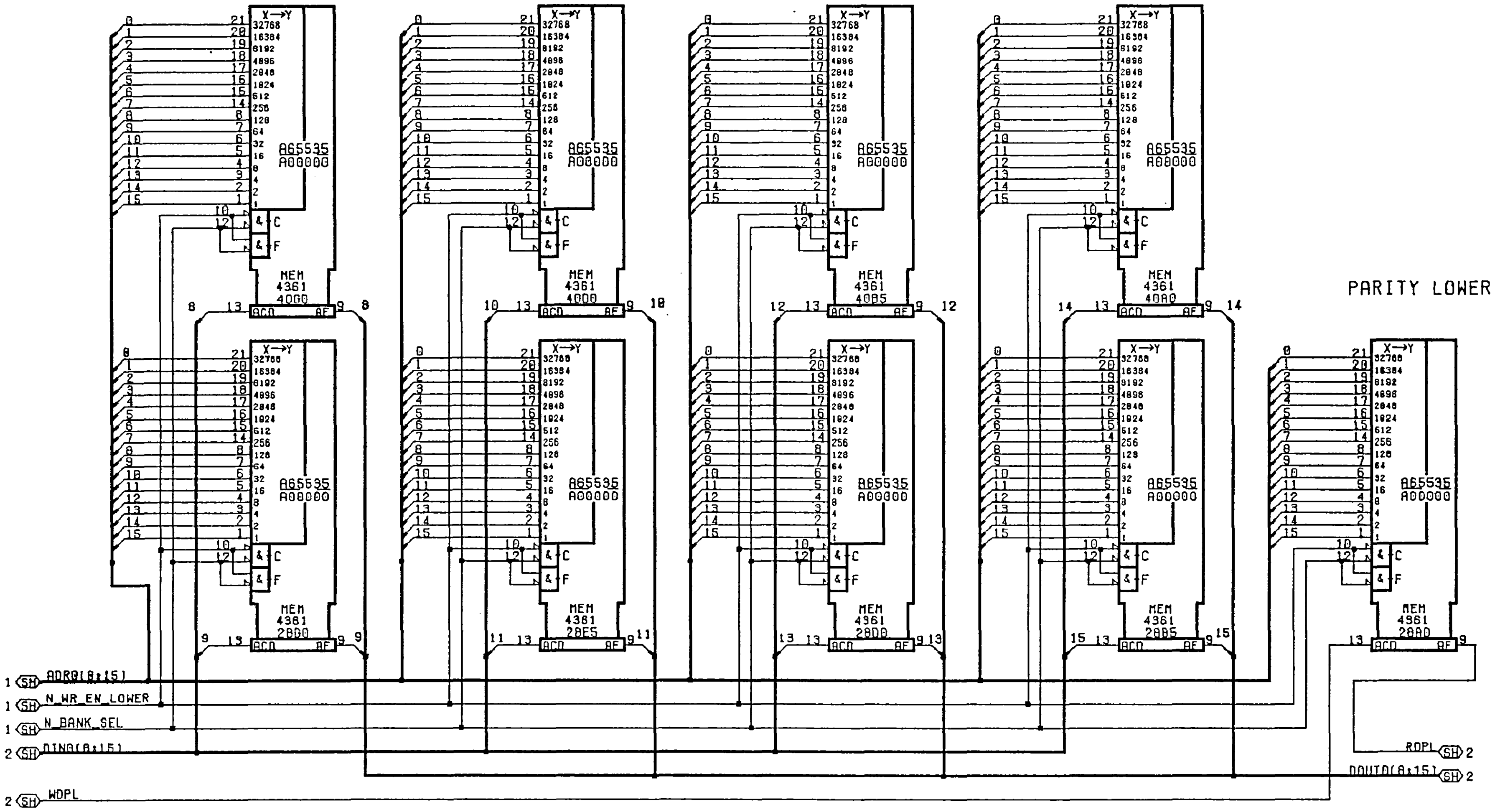
To present the information in this chapter in a structured format, this page has been left blank.



MENTOR - CCC/CCC.CR/RAM_ROM.1 SHEET4

CONTROL DATA CORPORATION	RAM_ROM RAM UPPER DATA BITS 0:7	B	FSCM # 34010	DRAWING NO. 22114745
ARDEN HILLS OPERATIONS	LOC: A07	SHEET 4 OF 8	DATE 5/19/87	REV A

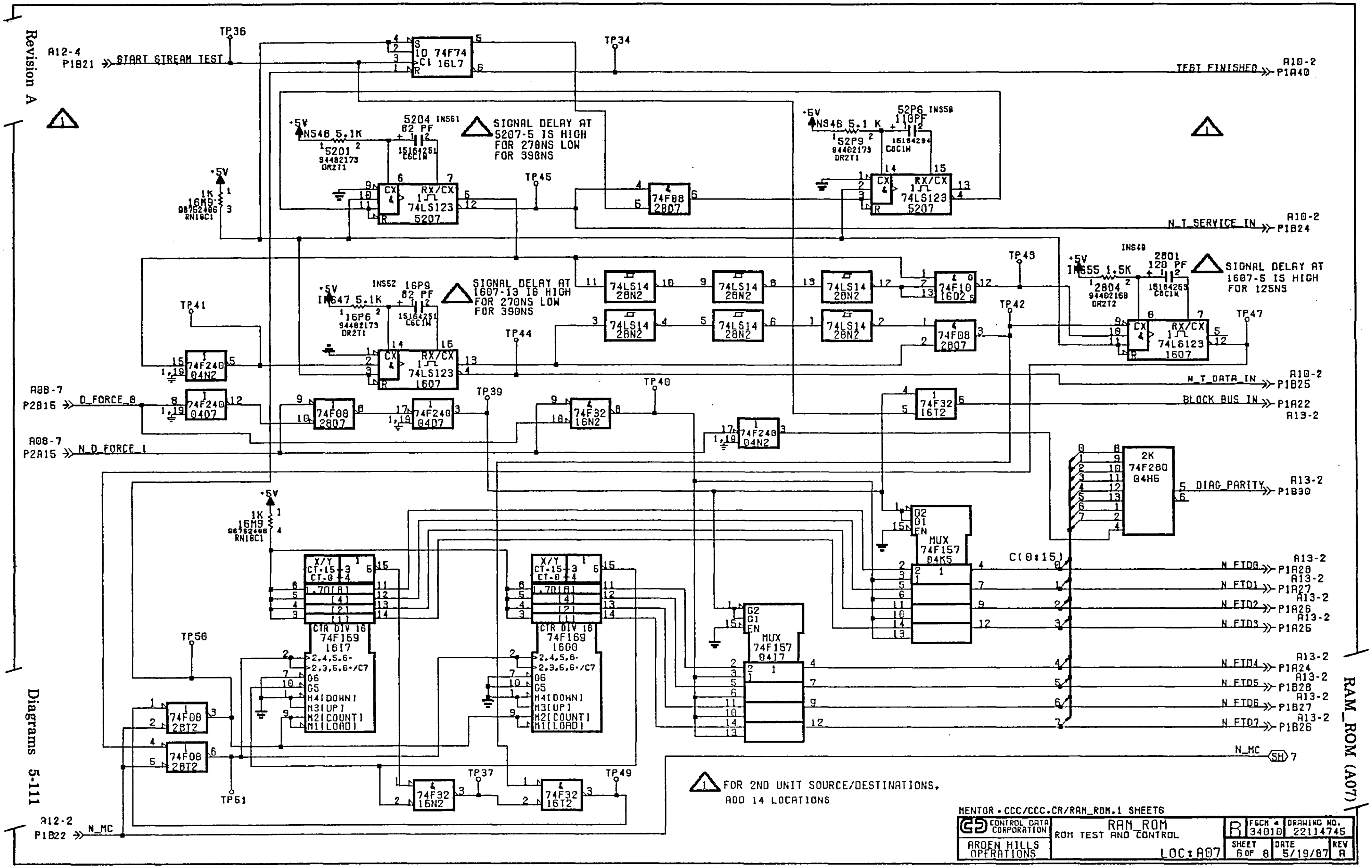
To present the information in this chapter in a structured format, this page has been left blank.



MENTOR - CCC/CCC.CR/RAM_ROM.1 SHEET5

CONTROL DATA CORPORATION	RAM_ROM RAM LOWER DATA BITS 8:15	B	FSCM ♣ 34010	DRAWING NO. 22114745
ARDEN HILLS OPERATIONS	LOC:A07	SHEET 5 OF 8	DATE 5/19/87	REV A

To present the information in this chapter in a structured format, this page has been left blank.



FOR 2ND UNIT SOURCE/DESTINATIONS,
ADD 14 LOCATIONS

MENTOR • CCC/CCC.CR/RAM_ROM.1 SHEETS

CONTROL DATA CORPORATION
ARDEN HILLS OPERATIONS

RAM_ROM
ROM TEST AND CONTROL
LOC:A07

B | FSCM # 34010 | DRAWING NO. 22114745
SHEET 6 OF 8 | DATE 5/19/87 | REV A

RAM_ROM (A07)

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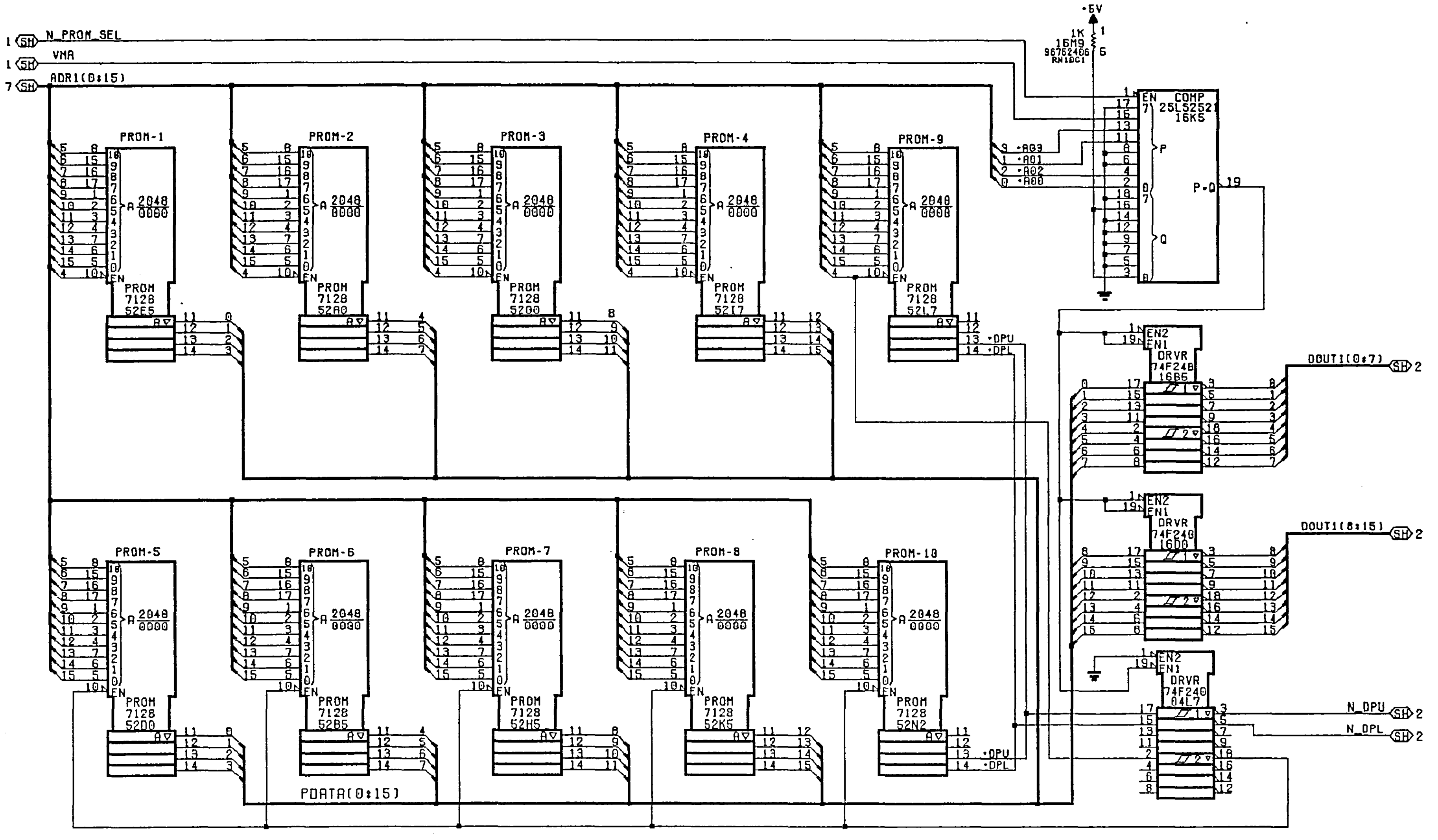
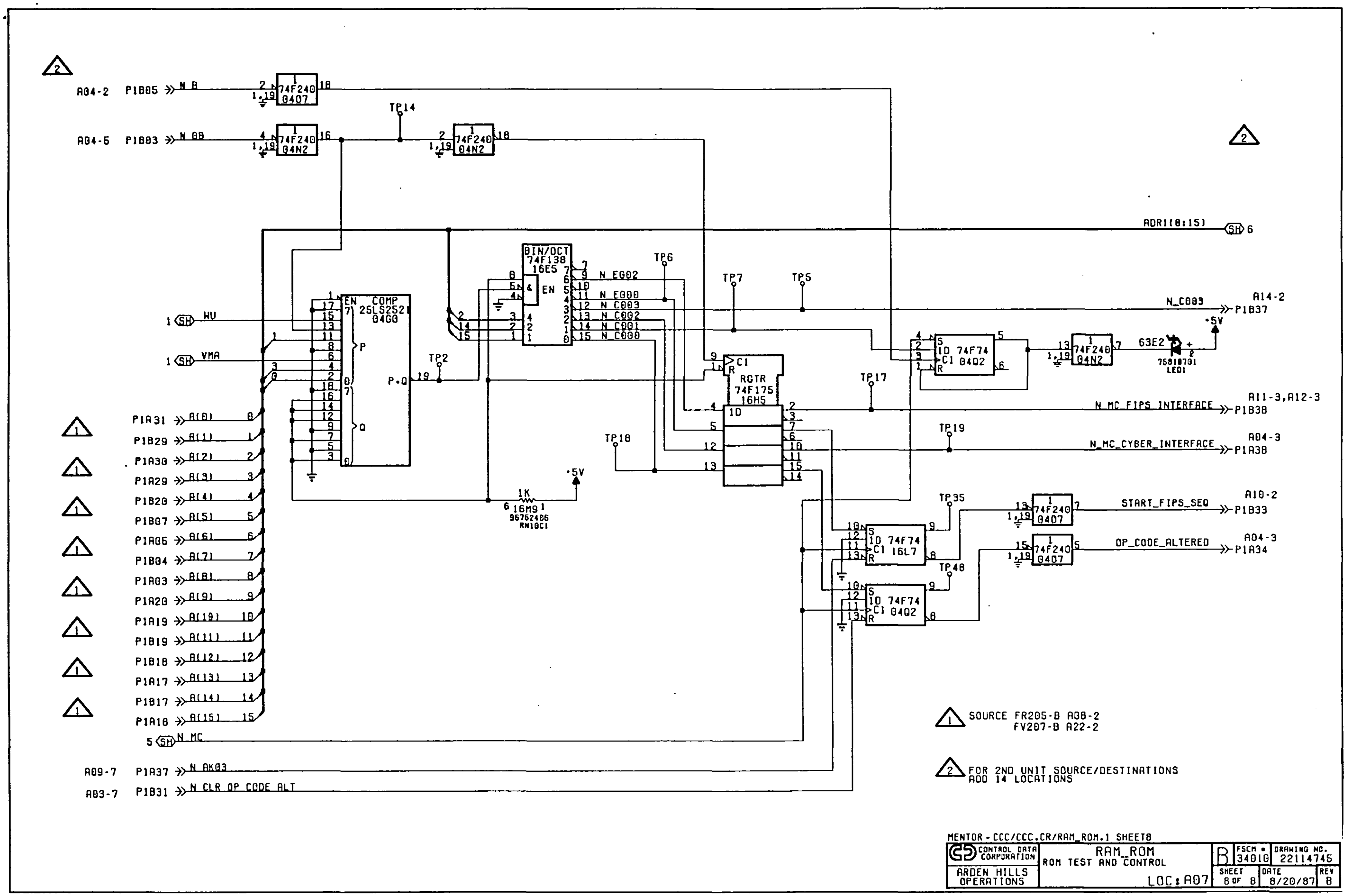


MENTOR • CCC/CCC.CR/RAM_ROM.1 SHEET7

CONTROL DATA CORPORATION	PROM RAM_ROM	B	FSCM • 34010	DRAWING NO. 22114745
ARDEN HILLS OPERATIONS	LOC: A07	SHEET 7 OF 8	DATE 5/19/87	REV A

To present the information in this chapter in a structured format, this page has been left blank.


A04-2 P1B05 N B
74F240 04O7
A04-5 P1B03 N OB
74F240 04N2
TP14
74F240 04N2
ADR1(0:15) SH 6
BIN/OCT 74F138 16E5
TP6
TP7
TP5
N E002
N E000
N C003
N C002
N C001
N C000
N_C003 P1B37 A14-2
1 SH HV
1 SH VMA
EN COMP 25LS2521 04G0
P
Q
P=Q
TP2
74F74 04O2
74F240 04N2
63E2
+5V
75818701 LED1
RGTR 74F175 16H5
TP17
TP18
TP19
N_MC_FIPS_INTERFACE P1B38 A11-3,A12-3
N_MC_CYBER_INTERFACE P1A38 A04-3
1K 16M9 96752406 RN10C1
+5V
P1A31 A(0)
P1B29 A(1)
P1A30 A(2)
P1A29 A(3)
P1B28 A(4)
P1B07 A(5)
P1A05 A(6)
P1B04 A(7)
P1A03 A(8)
P1A20 A(9)
P1A19 A(10)
P1B19 A(11)
P1B18 A(12)
P1A17 A(13)
P1B17 A(14)
P1A16 A(15)
5 SH N MC
A09-7 P1A37 N AK03
A03-7 P1B31 N CLR OP CODE ALT
TP35
74F74 16L7
TP40
74F74 04O2
74F240 04O7
START_FIPS_SEQ P1B33 A10-2
74F240 04O7
OP_CODE_ALTERED P1A34 A04-3
1 SOURCE FR205-B A08-2 FV207-B A22-2
2 FOR 2ND UNIT SOURCE/DESTINATIONS ADD 14 LOCATIONS
MENTOR-CCC/CCC.CR/RAM_ROM.1 SHEET8
CONTROL DATA CORPORATION
ARDEN HILLS OPERATIONS
RAM_ROM
ROM TEST AND CONTROL
LOC: A07
B
FSCM # 34010
DRAWING NO. 22114745
SHEET 8 OF 8
DATE 8/20/87
REV B

Transfer Logic (A08)

The revision levels for the Transfer Logic diagrams are shown on the facing page.

PAGE								REVISION RECORD					
8	7	6	5	4	3	2	1	ECO	DESCRIPTION	DRFT	DATE	CHKD	APVD
A	A	A	A	A	A	A	A		CLASS A RELEASED	EFA	05/86	NZ	RTH
B	B	B	B	B	B	B	B	CA48239	ADDED COVER, RE-INTERSHEET	MES	1/22/87	NS	NS
B	B	B	B	B	B	C	C	CA48647	SEE NOTE 5	MES	2/13/87	NS	NS

NOTES:

1. THIS DOCUMENT IS CONTAINED ON MAGNETIC TAPE. MAGNETIC TAPE IS STORED IN THE EDP GROUP OF ENGINEERING SERVICES SECTION,CDED DIVISION.
2. UPDATES TO LOGIC PRINTS MUST BE PERFORMED BY CALMA.
3. THE OFF SHEET SIGNAL REFERENCES DESIGNATE THE PAGE IN THE TITLE BLOCK AREA ON DIAGRAMS.
4. THE CHIP IDENTIFIERS ON PWA-22179698 WERE CHANGED TO 'F' TYPE CHIPS. UNLESS OTHERWISE NOTED. EXAMPLE 'S74' ON PWA-53595831 IS NOW 'F74' ON PWA-22179698.
5. THE 'F240' CHIPS AT LOCATIONS 0407. 04RT. 04T2. 0402 ON PAGE 2 WERE CHANGED BACK TO 'S240' TYPE CHIPS ON PWA-22110278.

DETACHED LISTS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN
TOLERANCES
PLACE ± PLACE ± ANGLES ±
MATERIAL
FINISH

DWN	E F ARLANDSON	11/6/85
CHKD	N ZAK	11/6/85
ENGR	R.T. HENNING	5/9/86
MFG	B.J. REILAND	5/9/86
APVD	R.T. HENNING	5/9/86

EQUIP. NO. FR205-B

THIRD ANGLE PROJECTION

CONTROL DATA

ARDEN HILLS OPERATIONS
ST. PAUL. MINN.

TITLE

LOGIC DIAGRAM
TRANSFER LOGIC

PWA-22110278 PWB-22179691

SIZE C | FSCM NO. 34010 | DWG NO. 22179696

A08 | SHEET XFER 1-F | PAGE 1 OF 8

Transfer Logic (A08-2)

General

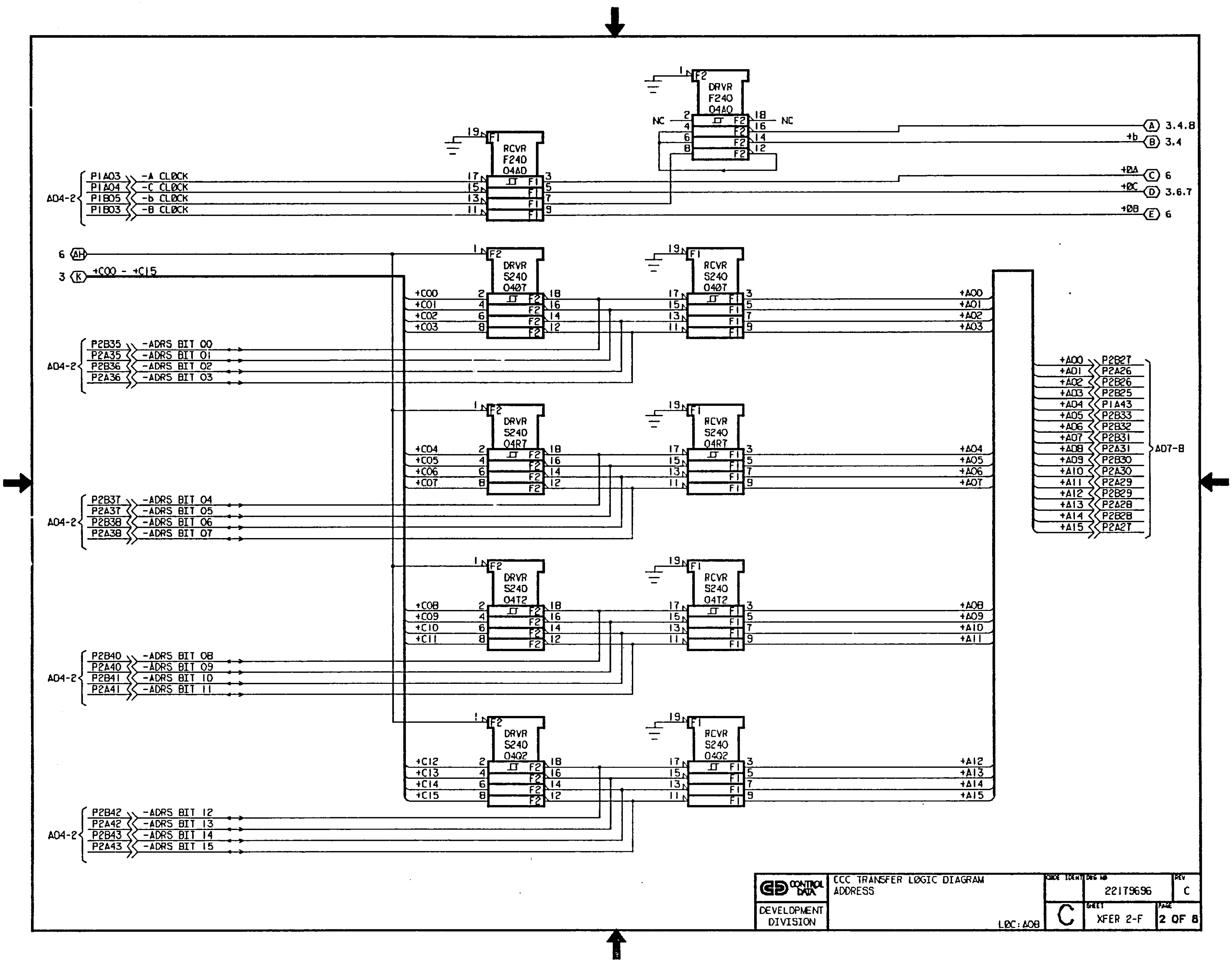
The transfer logic provides the necessary circuits to transfer data from the CYBER channel interface through memory to the FIPS device, and vice versa, without requiring use of either interface UDI. The processor sets up the transfer operation by initiating a FIPS device interface control sequence to load the transfer registers. The processor then places the CYBER channel interface and/or the FIPS device interface in transfer mode. During the transfer, data is written into a circular buffer by one interface and read from that buffer by the other interface. When an interface is in transfer mode, the interface memory slot time is used by the transfer logic and the interface UDI is unable to reference memory. The UDI regains its memory slot time when the transfer is completed or when a Master Clear signal is received.

Address Bus Receivers

During a programmable read only memory (PROM) operation, the 16-bit address (bits 00 through 15) is sent from the address bus to the receivers on the bidirectional circuit pins. The address is then sent from the receivers to the PROM (A07-8).

Address Bus Drivers

During a DMA write or read operation, the address (bits C00 through C15) from the CCC address register/counter or CYBER address register/counter (A08-3) is sent from the drivers to the address bus on the same bidirectional circuit pins used by the address bus receivers.



CONTROL DATA

DEVELOPMENT DIVISION

CCC TRANSFER LØGIC DIAGRAM
ADDRESS

LØC: A08

DWG NO 22179696

REV C

C

SHEET XFER 2-F

PAGE 2 OF 8

Transfer Logic (A08-3)

Address Register

A 16-bit address (bits AD00 through AD15) is loaded onto the address bus by the FIPS interface UDI (A09) and sent to the address register of the transfer logic before a data transfer starts. The address register routes the address (bits B00 through B15) to the FIPS address counter and also to the CYBER address counter.

FIPS Address Counter

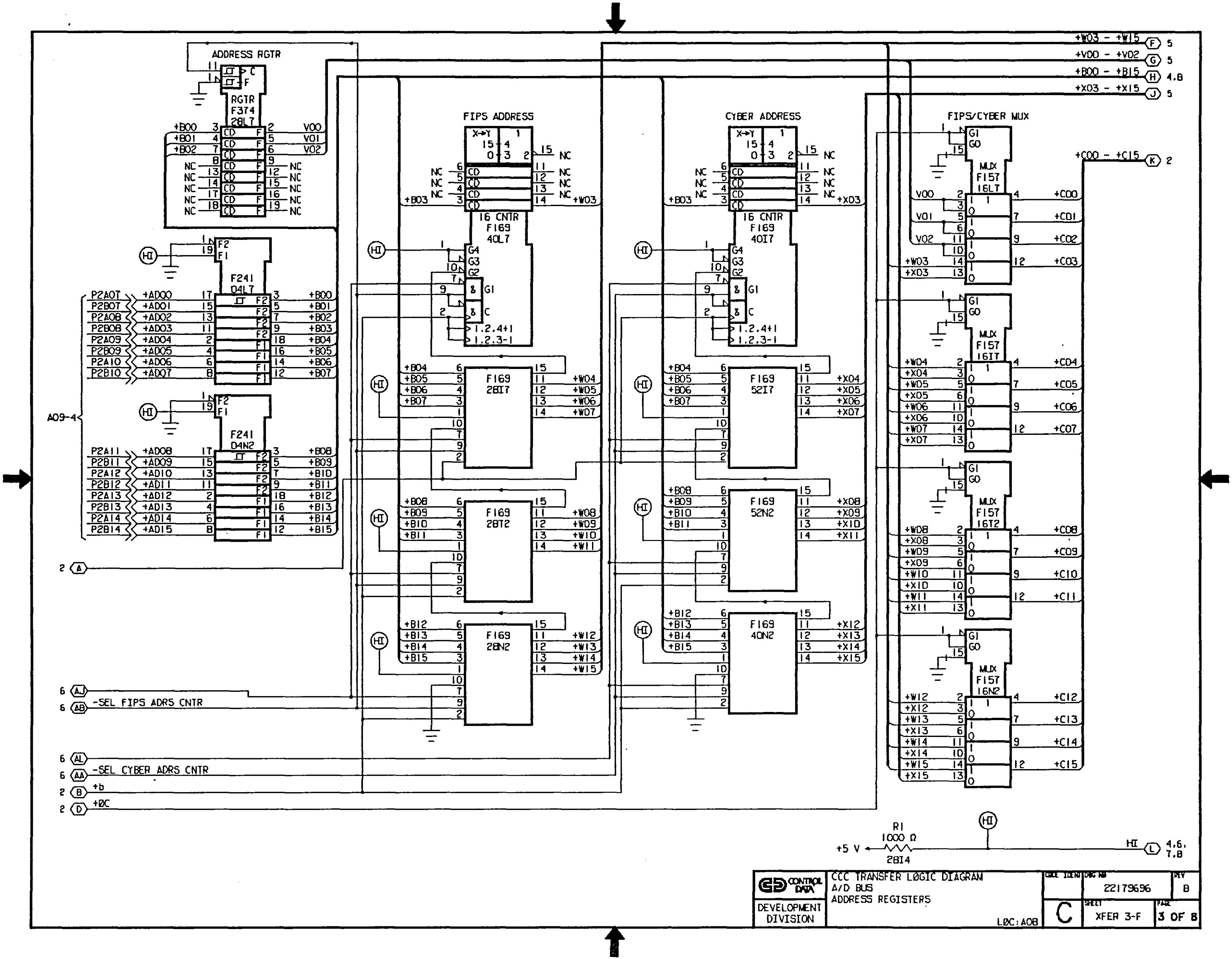
The FIPS address counter provides addresses for data transfers during the memory access time (slot time) of the FIPS interface. The FIPS interface UDI (A09) is disabled at this time. Bits 00, 01, and 02 are held in the address register and do not change during a data transfer. Bits 03 through 15 are held in the FIPS address counter. The counter increments the address each time the FIPS interface reads a word from memory (A07) or writes a word into memory. The counter has a range from 0 to 511 and wraps around to provide a 512-location circular buffer in memory. Bits 00, 01, and 02 form the upper three bits of the address used in the circular buffer.

CYBER Address Counter

The CYBER address counter provides the addresses for data transfers during the memory slot time of the CYBER interface. The address register is the same as that used for the FIPS address counter. The CYBER address counter increments the address each time the CYBER interface reads or writes a memory word. Operation of this counter is identical to that described for the FIPS address counter.

FIPS/CYBER Multiplexer

The 0C clock determines the memory slot time for the CYBER interface and gates the CYBER address bits (V00 through V02 and X03 through X15) through the multiplexer. When the 0C clock is at a logic 0 level (0C clock not present), the FIPS address bits (V00 through V02 and W03 through W15) are gated through the multiplexer. The multiplexer output bits (C00 through C15) are sent to the address bus drivers (A08-2).



CCC TRANSFER LØGIC DIAGRAM
A/D BUS
ADDRESS REGISTERS

CONTROL DATA
DEVELOPMENT DIVISION

LØC: A08

CODE IDENT	DWG NO	REV
	22179696	B
C	SHEET XFER 3-F	PAGE 3 OF 8

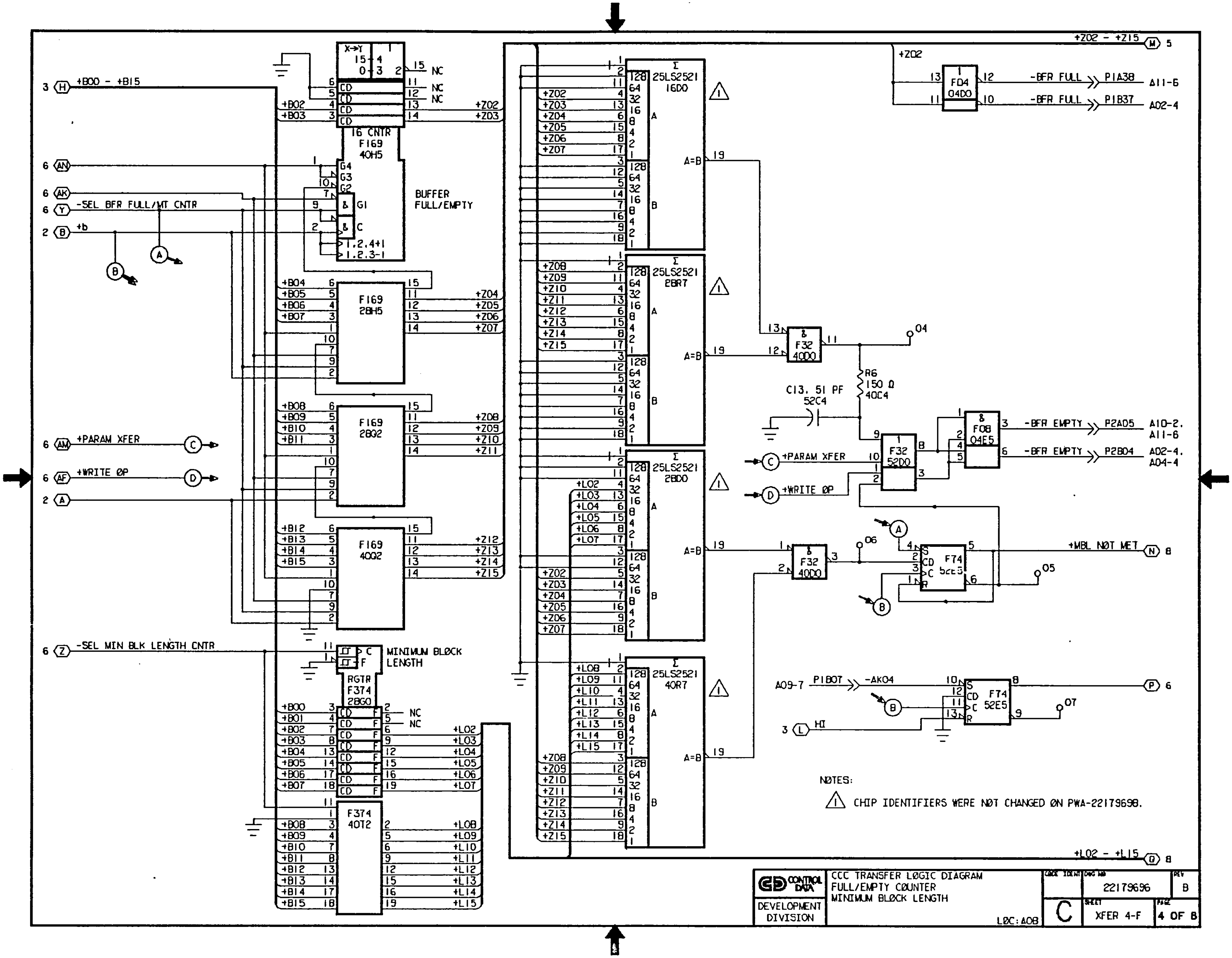
Transfer Logic (A08-4)

Buffer Full/Empty Counter

This is a 14-bit counter that increments when a data word is written into the 8K location circular buffer in memory (A07). It decrements when a data word is read from the buffer. The output of the counter is decoded to provide either a Buffer Full (8192_{10} or 2000_{16} count) or Buffer Empty (0 count) signal to the CYBER interface and FIPS interface data control circuits. Data cannot be written into memory during a buffer full condition or read from memory during a buffer empty condition. This counter is loaded by the processor via the FIPS device interface.

Minimum Block Length (MBL) Register

This is a 14-bit register that contains the value of the minimum number of words required in a block of data. The output of the MBL register is compared to the output of the buffer full/empty counter during a read operation. A buffer empty signal is sent to the CYBER interface (A02-4) until the buffer full/empty counter reaches a value equal to that set in the MBL counter. This prohibits data blocks shorter than the required minimum block length from being transferred to the CYBER interface. The contents of the MBL register are not used during a write operation. This register is loaded by the processor via the FIPS device interface.

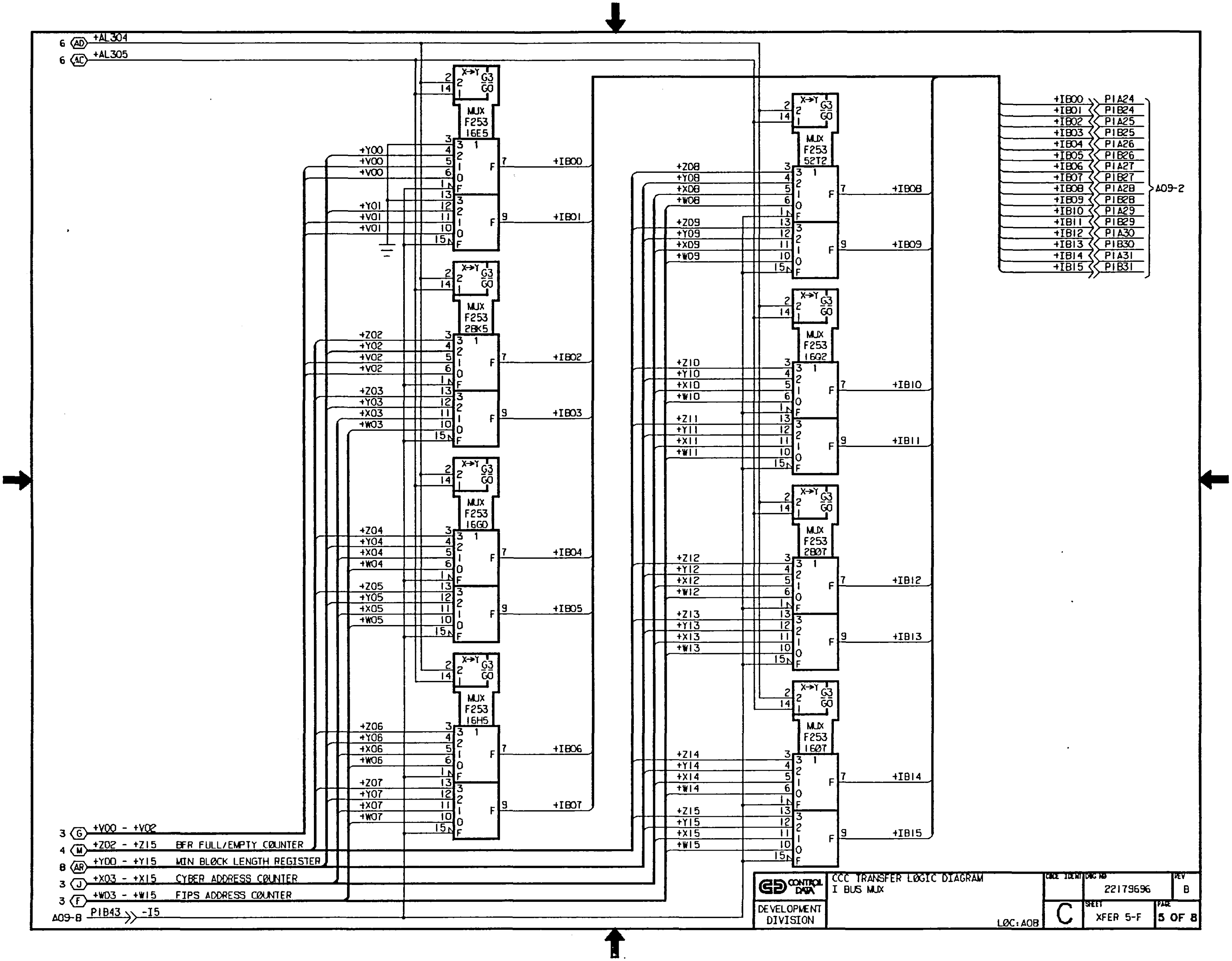

+B00 - +B15
16 CNTR
F169
40H5
BUFFER
FULL/EMPTY
-SEL BFR FULL/MT CNTR
+b
F169
28H5
F169
28G2
F169
40G2
+PARAM XFER
+WRITE ØP
-SEL MIN BLK LENGTH CNTR
MINIMUM BLØCK
LENGTH
RGTR
F374
28G0
F374
40T2
NC
25LS2521
16D0
25LS2521
28R7
25LS2521
28D0
25LS2521
40R7
A=B
+Z02 - +Z15
+Z02
F04
04D0
-BFR FULL
P1A38
A11-6
P1B37
A02-4
F32
40D0
04
R6
150 Ω
40C4
C13, 51 PF
52C4
F32
52D0
F08
04E5
-BFR EMPTY
P2A05
A10-2,
A11-6
P2B04
A02-4,
A04-4
F74
52E5
+MBL NØT MET
05
06
07
A09-7
P1B07
-AK04
HI
+L02 - +L15
+Z02 - +Z07
+Z08 - +Z15
+L02 - +L07
+L08 - +L15
+B00 - +B07
+B08 - +B15
NØTES:
CHIP IDENTIFIERS WERE NØT CHANGED ØN PWA-22179698.
CONTROL DATA
DEVELOPMENT
DIVISION
CCC TRANSFER LØGIC DIAGRAM
FULL/EMPTY CØUNTER
MINIMUM BLØCK LENGTH
LØC: A08
22179696
B
C
XFER 4-F
4 OF 8

Transfer Logic (A08-5)

I Bux Mux

Addressable latch bits AL304 and AL305 are decoded to provide enables to the multiplexers. The following information is gated to the I bus for the various combinations of the enable bits.

AL304	AL305	I Bus Information
0	0	FIPS address (bits W03 through W15 and V00 through V02)
0	1	CYBER address (bits W03 through W15 and V00 through V02)
1	0	Minimum block length (bits Y00 through Y15)
1	1	Buffer full/empty count (bits Z02 through Z15, also note that Mux bits IB00 and IB01 become zeros because of the grounded inputs at U34 pins 3 and 13)

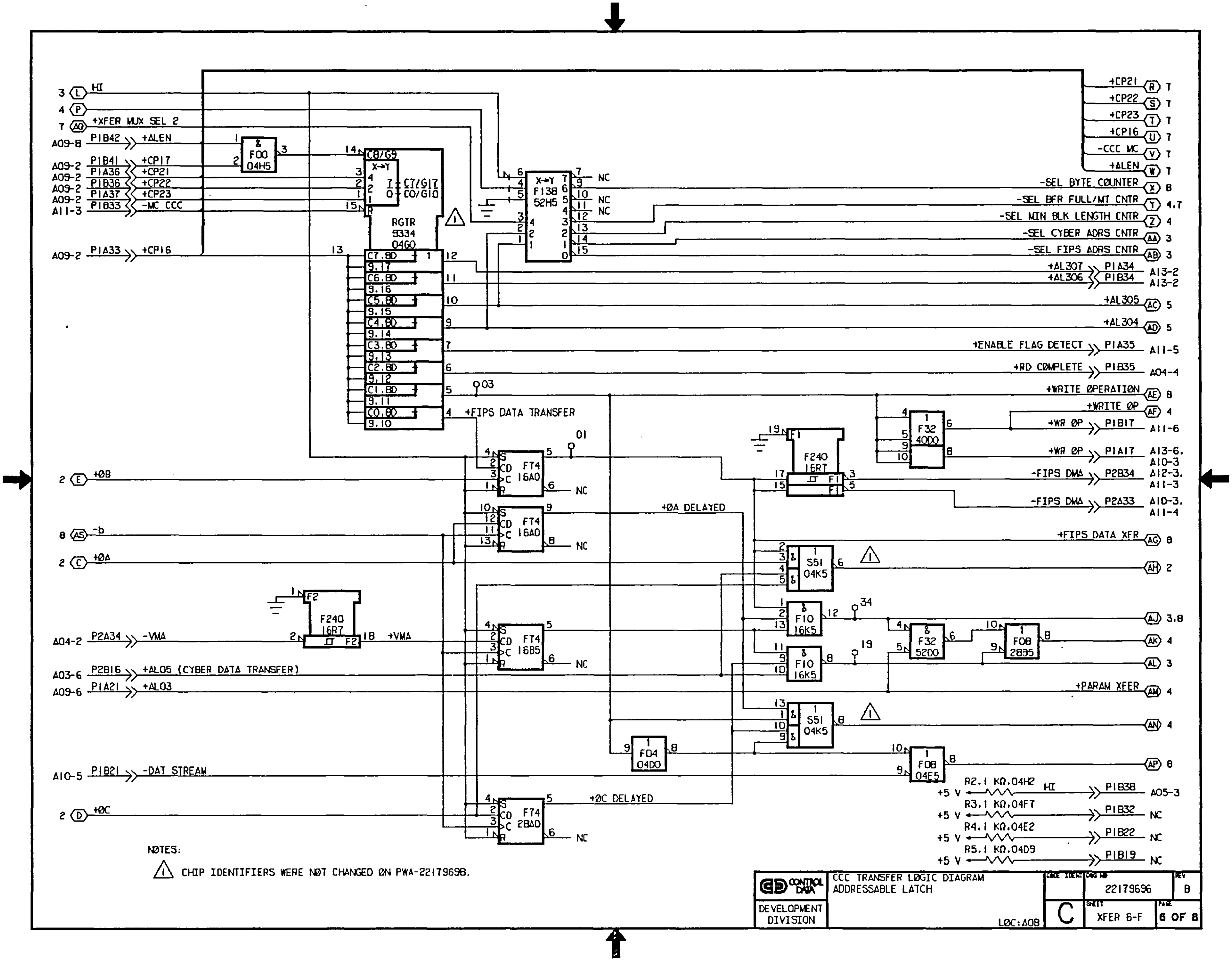


6 AD +AL304
6 AC +AL305
X→Y G3 G0
MUX F253 16E5
MUX F253 2BK5
MUX F253 16G0
MUX F253 16H5
MUX F253 52T2
MUX F253 16Q2
MUX F253 2B0T
MUX F253 160T
+Y00 +V00 +V00
+Y01 +V01 +V01
+Z02 +Y02 +V02 +V02
+Z03 +Y03 +X03 +W03
+Z04 +Y04 +X04 +W04
+Z05 +Y05 +X05 +W05
+Z06 +Y06 +X06 +W06
+Z07 +Y07 +X07 +W07
+Z08 +Y08 +X08 +W08
+Z09 +Y09 +X09 +W09
+Z10 +Y10 +X10 +W10
+Z11 +Y11 +X11 +W11
+Z12 +Y12 +X12 +W12
+Z13 +Y13 +X13 +W13
+Z14 +Y14 +X14 +W14
+Z15 +Y15 +X15 +W15
+IB00
+IB01
+IB02
+IB03
+IB04
+IB05
+IB06
+IB07
+IB08
+IB09
+IB10
+IB11
+IB12
+IB13
+IB14
+IB15
+IB00 PIA24
+IB01 PIB24
+IB02 PIA25
+IB03 PIB25
+IB04 PIA26
+IB05 PIB26
+IB06 PIA27
+IB07 PIB27
+IB08 PIA28
+IB09 PIB28
+IB10 PIA29
+IB11 PIB29
+IB12 PIA30
+IB13 PIB30
+IB14 PIA31
+IB15 PIB31
A09-2
3 G +V00 - +V02
4 M +Z02 - +Z15 BFR FULL/EMPTY COUNTER
8 AR +Y00 - +Y15 MIN BLOCK LENGTH REGISTER
3 J +X03 - +X15 CYBER ADDRESS COUNTER
3 F +W03 - +W15 FIPS ADDRESS COUNTER
A09-8 PIB43 -I5
CONTROL DATA
DEVELOPMENT DIVISION
CCC TRANSFER LOGIC DIAGRAM
I BUS MUX
LOC:A08
C
22179696
B
XFER 5-F
5 OF 8

Transfer Logic (A08-6)

Addressable Latch Register

The outputs of the addressable latch register are selected by microcode bits CP17, CP21, CP22, and CP23 from the FIPS interface UDI (A09-2). Register outputs AL304 and AL305, and AL306 and AL307 are used to gate information through the I bus multiplexers (A08-5 and A13-2) to the I bus. The write operation output signal of the register functions as a direction latch that is used to indicate either a read or write operation. When cleared, a read operation is performed and data flow is from the FIPS device interface to the CYBER channel interface. When set, a write operation is performed and data flow is from the CYBER channel interface to the FIPS device interface.



NOTES:

⚠ CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-22179698.

CONTROL DATA

DEVELOPMENT DIVISION

CCC TRANSFER LOGIC DIAGRAM
ADDRESSABLE LATCH

LOC:A08

CODE IDENT	DWG NO	REV
C	22179696	B
	SHEET XFER 6-F	PAGE 6 OF 8

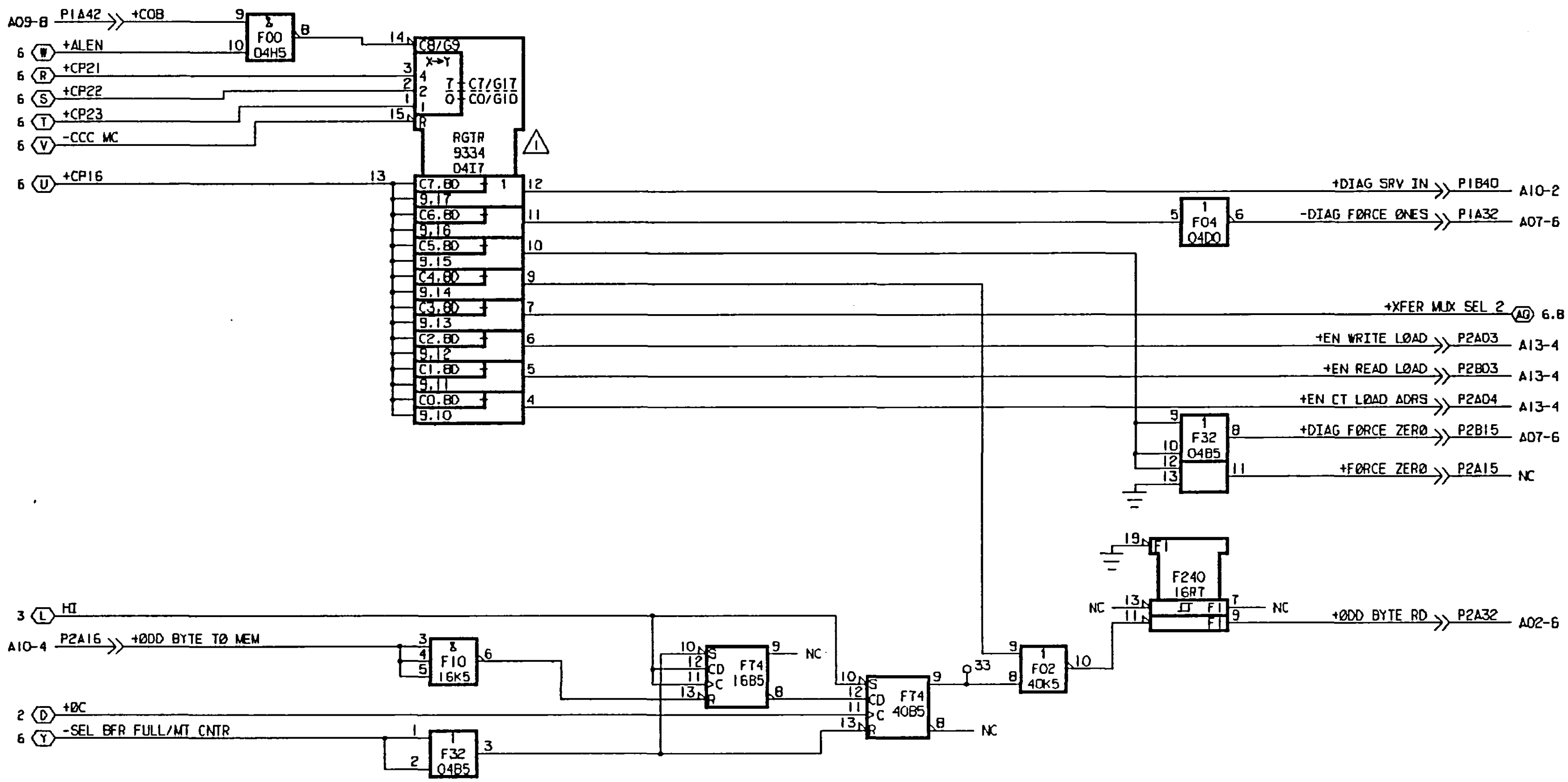
Transfer Logic (A08-7)

Addressable Latch Register

The outputs of the addressable latch register are selected by microcode bits CP21, CP22, and CP23 from the FIPS interface UDI (A09-2).

Register outputs are used to control diagnostic functions and to enable loading code tables.

The Transfer Mux Select 2 signal is used to enable the byte counter (A08-8) output into the I bus multiplexer (A08-5).



NOTES:

⚠ CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-22179698.

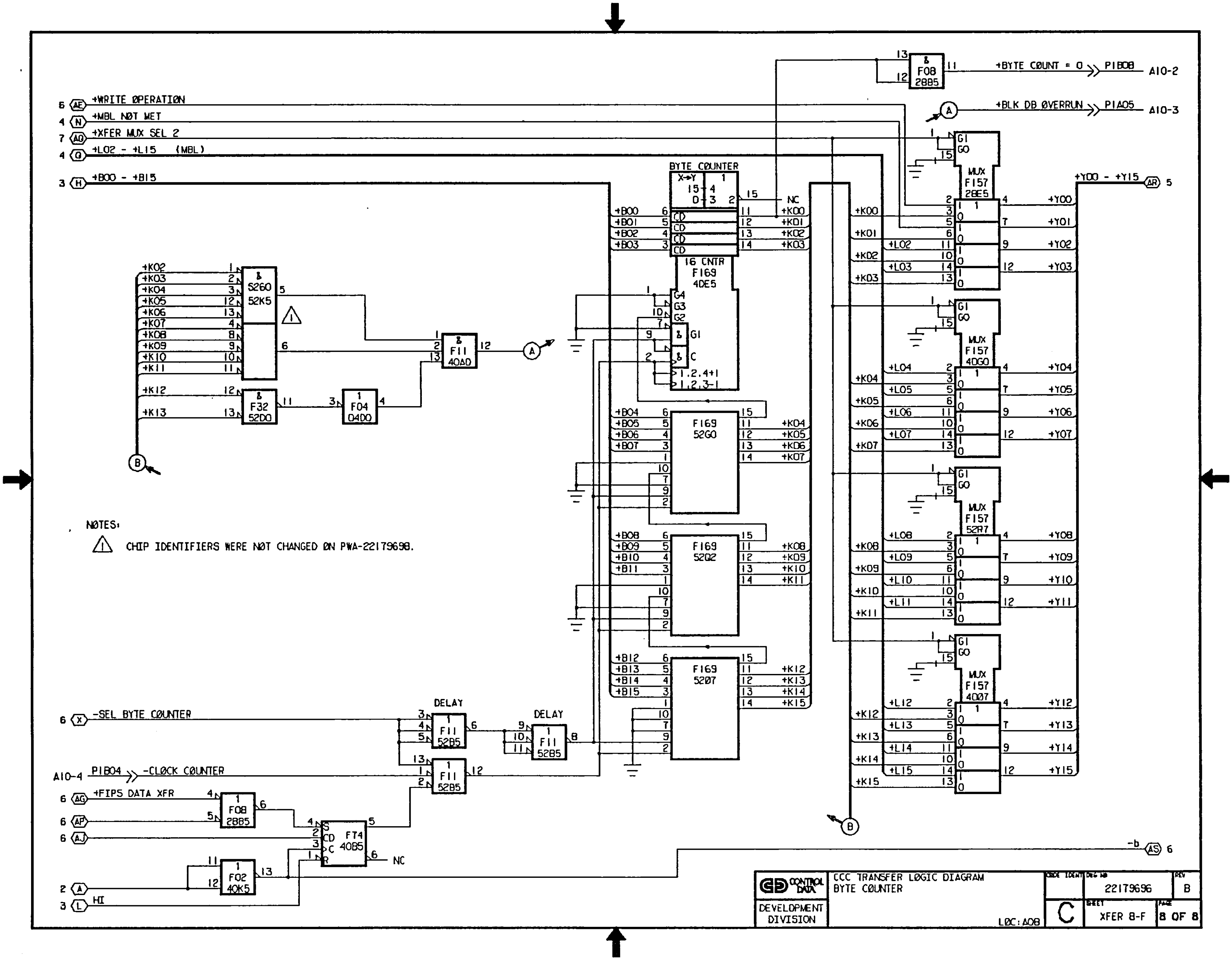
CONTROL DATA	CCC TRANSFER LOGIC DIAGRAM ADDRESSABLE LATCH	CAGE IDENT	DWG NO 22179696	REV B
DEVELOPMENT DIVISION	LOC:A08	C	SHEET XFER T-F	PAGE 7 OF 8

Transfer Logic (A08-8)

Byte Counter

The byte counter is a 16-bit counter that may be used to terminate a FIPS data transfer without waiting for the FIPS device to send a Status-In signal (A10-2). The counter is loaded with one less than the number of bytes that are to be transferred. During a write operation, the count is decremented by one count each time a byte is accepted by the FIPS device. During a read operation, the count is decremented by one count each time a byte is received from the FIPS device and written into coupler memory (A07).

The byte counter output is sent to a multiplexer. The multiplexer gates either the byte counter bits or the MBL counter (A08-4) bits to the I bus multiplexer (A08-5). The Byte Count = 0 signal is sent to the control flag register of the stream logic (A10-2).



NOTES:

⚠ CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-22179698.

CONTROL DATA
DEVELOPMENT DIVISION

CCC TRANSFER LOGIC DIAGRAM
BYTE COUNTER

LOC: A08

C | 22179696 | B
XFER 8-F | 8 OF 8

FIPS 2K UDI (A09)

The revision levels for the FIPS 2K UDI (A09) diagrams are shown on the facing page.

PAGE									REVISION RECORD					
9	8	7	6	5	4	3	2	1	ECO	DESCRIPTION	DRFT	DATE	CHKD	APVD
A	A	A	A	A	A	A	A	A	CA48097	CLASS A RELEASED	MES	8/19/86	NS	NS
B	B	B	B	B	B	B	B	B	CA48239	ADDED COVER, RE-INTERSHEET	MES	9/16/86	NS	NS
B	B	B	B	B	B	B	B	C	CA48888	NEW PWA NUMBER	KMS	5/11/87	NS	NS
B	B	B	B	B	B	B	B	D	CA49315	NEW PWA NUMBER	KMS	3/21/88	KS	KS

NOTES:

1. THIS DOCUMENT IS CONTAINED ON MAGNETIC TAPE. MAGNETIC TAPE IS STORED IN THE EDP GROUP OF ENGINEERING SERVICES SECTION,CDED DIVISION.
2. UPDATES TO LOGIC PRINTS MUST BE PERFORMED BY CALMA.
3. THE OFF SHEET SIGNAL REFERENCES DESIGNATE THE PAGE IN THE TITLE BLOCK AREA ON DIAGRAMS.
4. THE CHIP IDENTIFIERS ON PWA-22110342 WERE CHANGED TO 'F' TYPE CHIPS, UNLESS OTHERWISE NOTED. EXAMPLE - 'F74' ON PWA-22110342 IS 'S74' ON PWA-67327641.

DETACHED LISTS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN
TOLERANCES
PLACE ± PLACE ± ANGLES ±
MATERIAL
FINISH

DWN	M E SCHMIDT	08/86
CHKD	N SAMPSON	08/86
ENGR	R T HENNING	08/86
MFG	B J REILAND	08/86
APVD	R T HENNING	08/86

EQUIP. NO. FR205-B

THIRD ANGLE PROJECTION

CONTROL DATA

ARDEN HILLS OPERATIONS
ST. PAUL, MINN.

TITLE
LOGIC DIAGRAM
FIPS 2K UDI

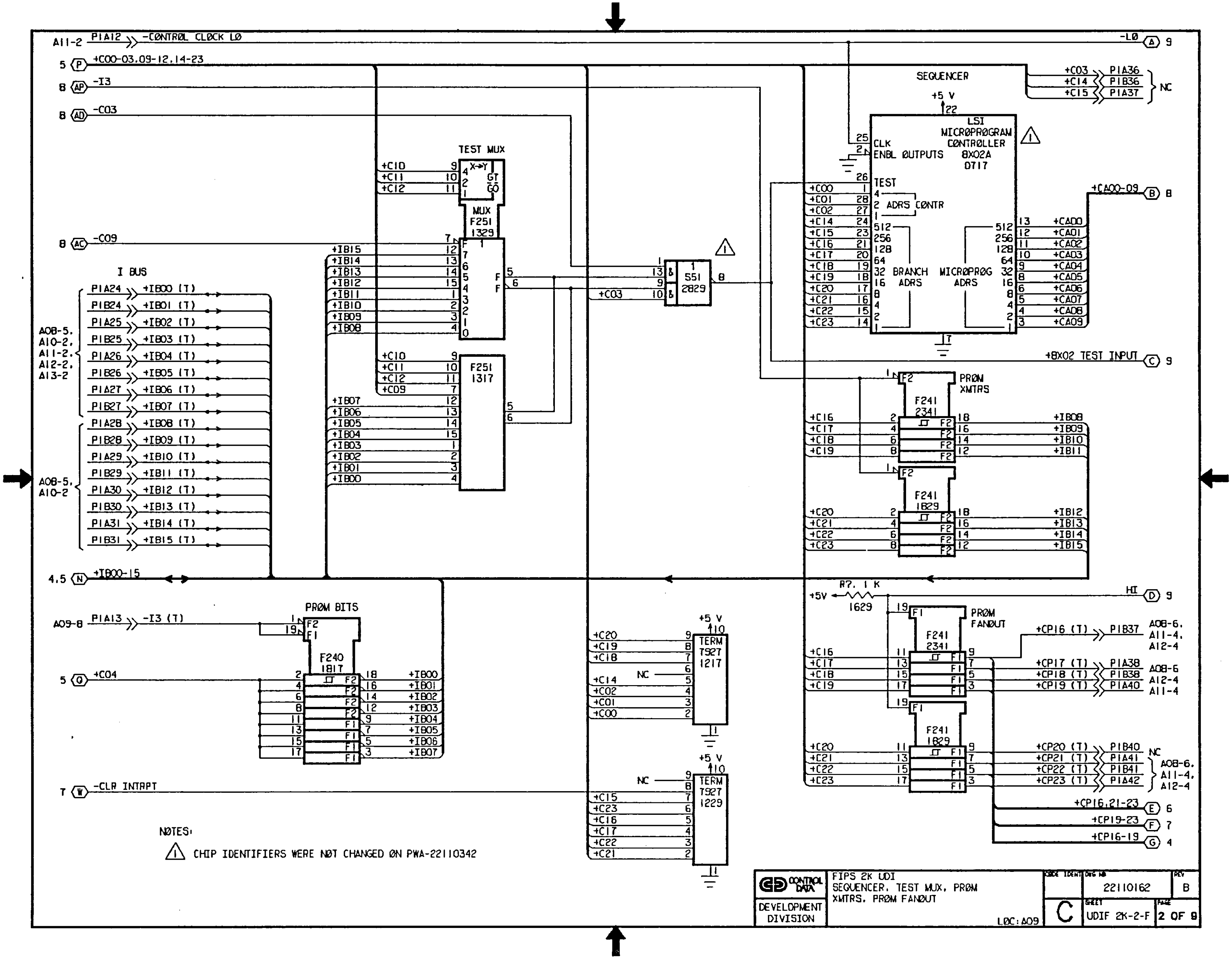
PWA-10284352
PWB-67046086

SIZE C
FSCM NO. 34010
DWG NO. 22110162
A09
SHEET UDIF 2K-1-F
PAGE 1 OF 9

CALMA

CSIZECOVER1

To present the information in this chapter in a structured format, this page has been left blank.



NOTES:

⚠ CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-22110342

CONTROL DATA

DEVELOPMENT DIVISION

FIPS 2K UDI
SEQUENCER, TEST MUX, PROM
XMTRS, PROM FANOUT

LOC: A09

C

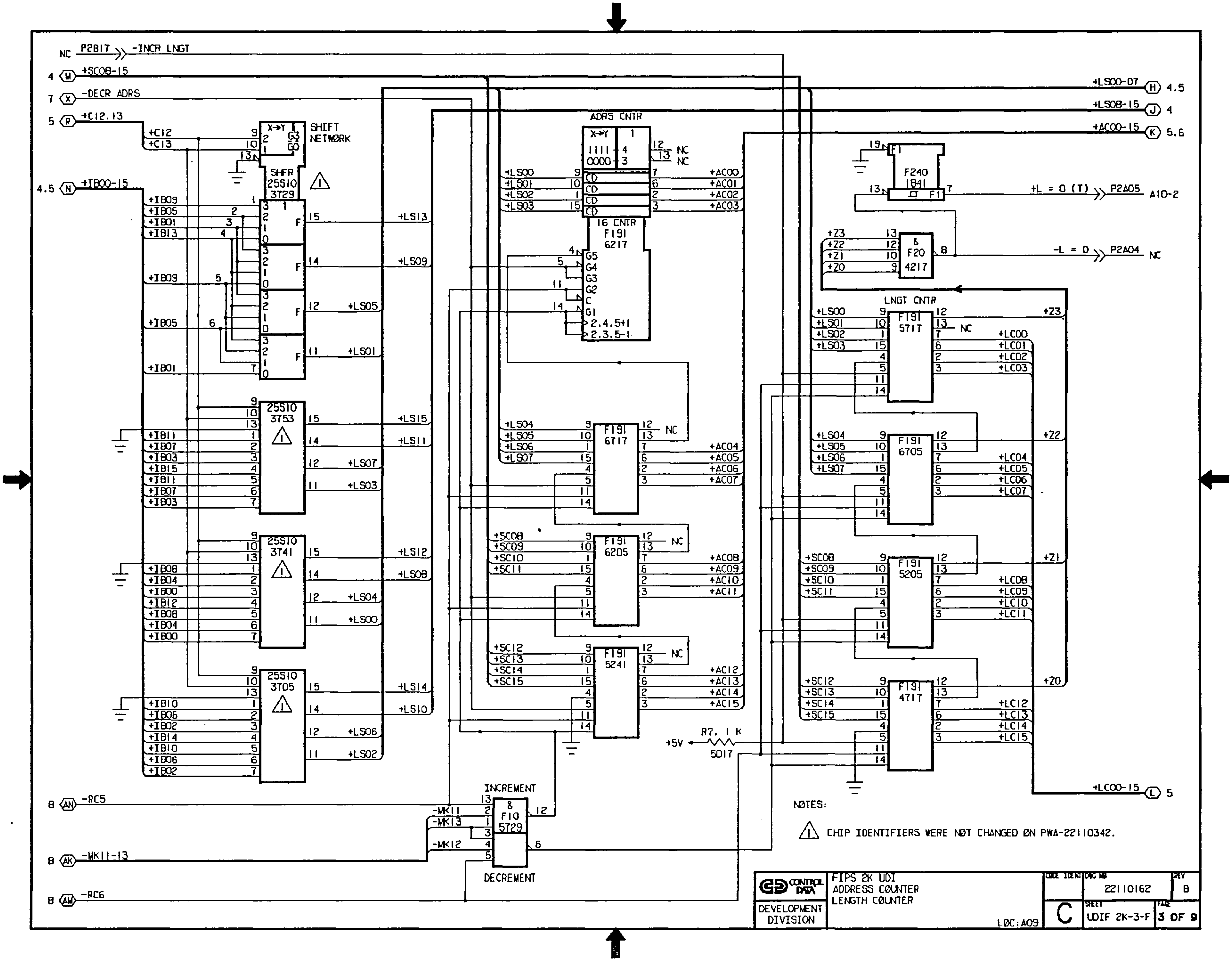
22110162

B

UDIF 2K-2-F

2 OF 9

To present the information in this chapter in a structured format, this page has been left blank.

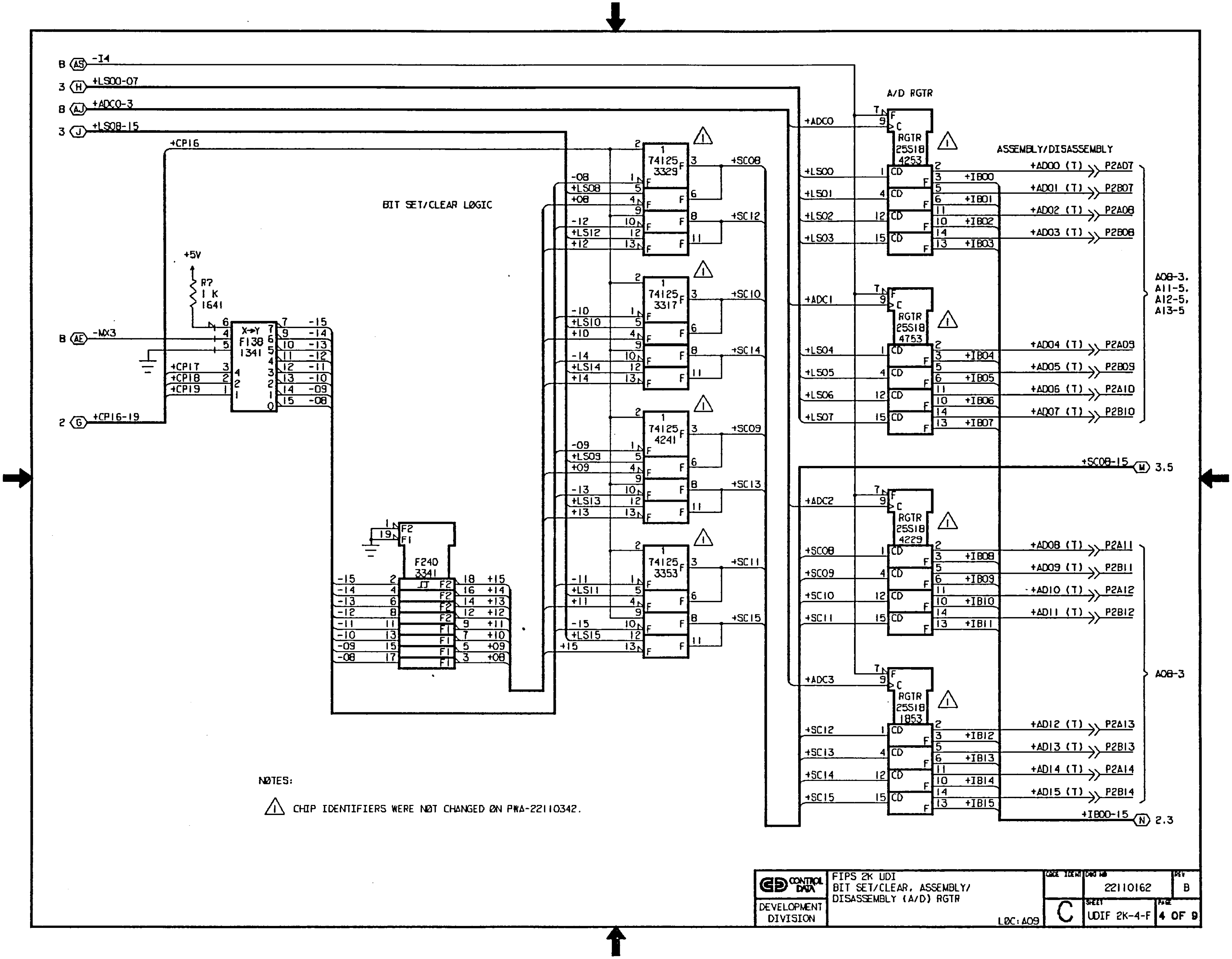


NOTES:

⚠1 CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-22110342.

CONTROL DATA DEVELOPMENT DIVISION	FIPS 2K UDI ADDRESS COUNTER LENGTH COUNTER LOC: A09	C	DWG NO 22110162 SHEET UDIF 2K-3-F	REV B PAGE 3 OF 9

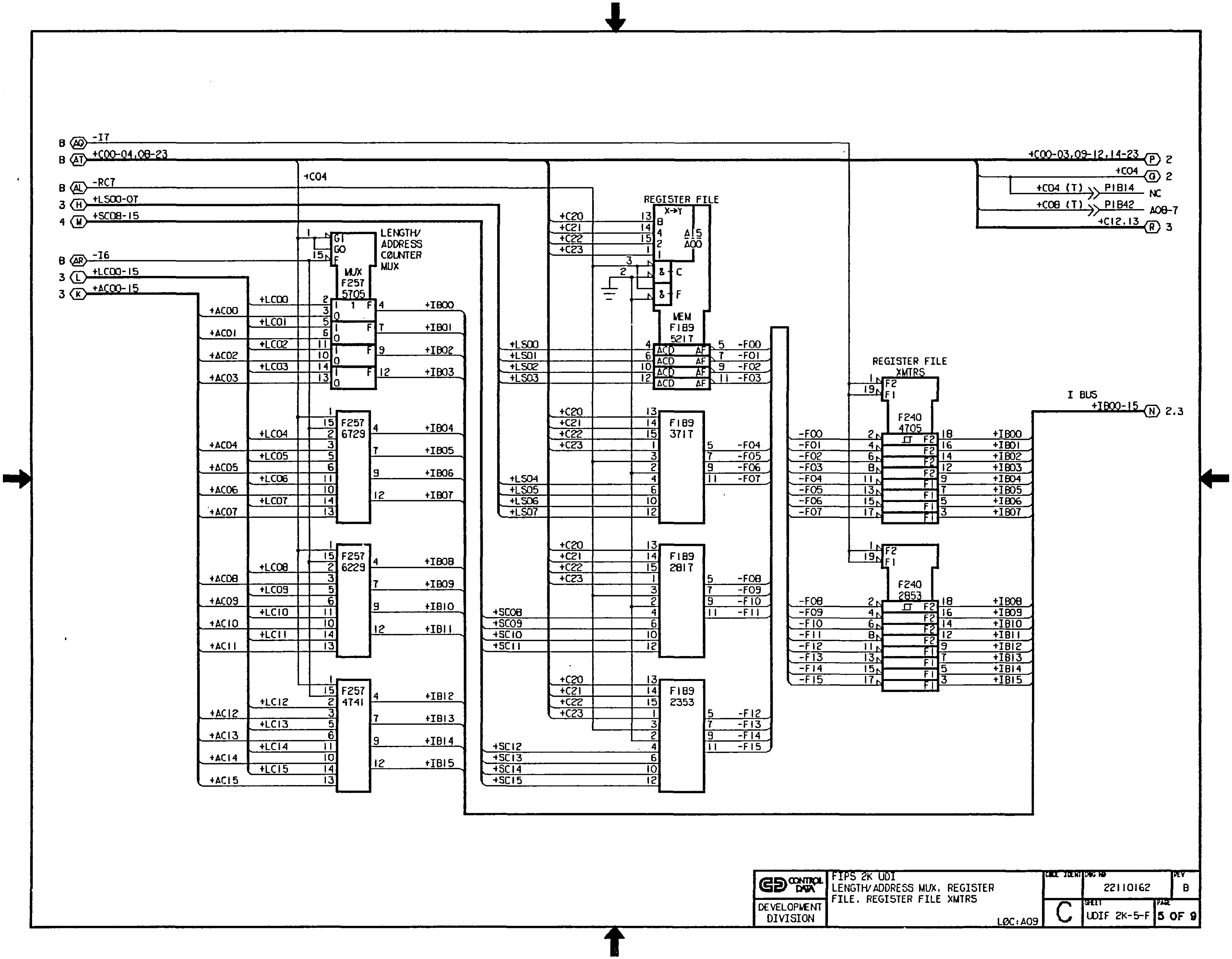
To present the information in this chapter in a structured format, this page has been left blank.



NOTES:

⚠ CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-22110342.

To present the information in this chapter in a structured format, this page has been left blank.



CONTROL DATA

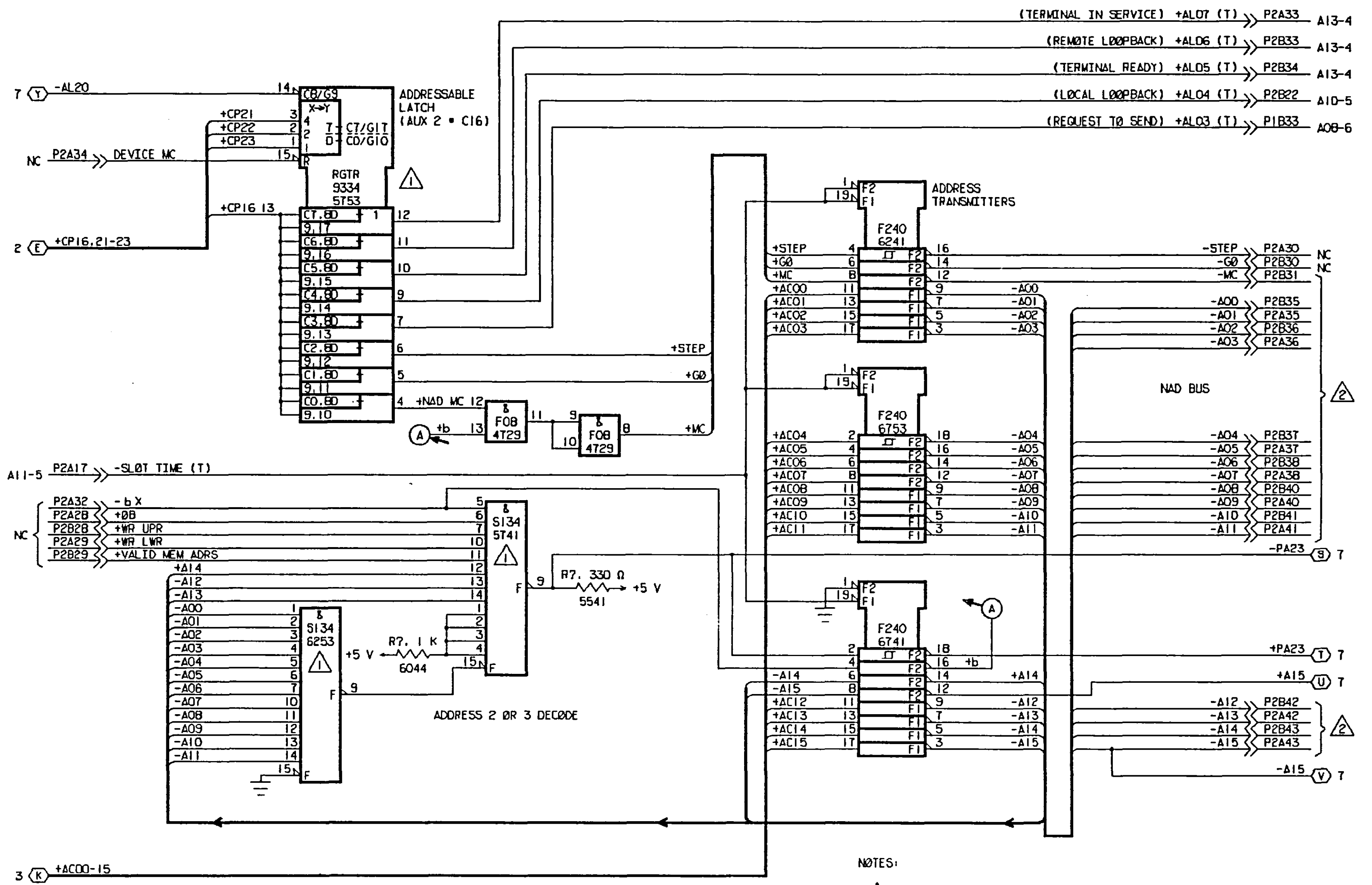
DEVELOPMENT DIVISION

FIPS 2K UDI
LENGTH/ADDRESS MUX, REGISTER FILE, REGISTER FILE XMTRS

LOC:A09

CODE IDENT	DWG NO	REV
C	22110162	B
	SHEET: UDIF 2K-5-F	PAGE: 5 OF 9

To present the information in this chapter in a structured format, this page has been left blank.

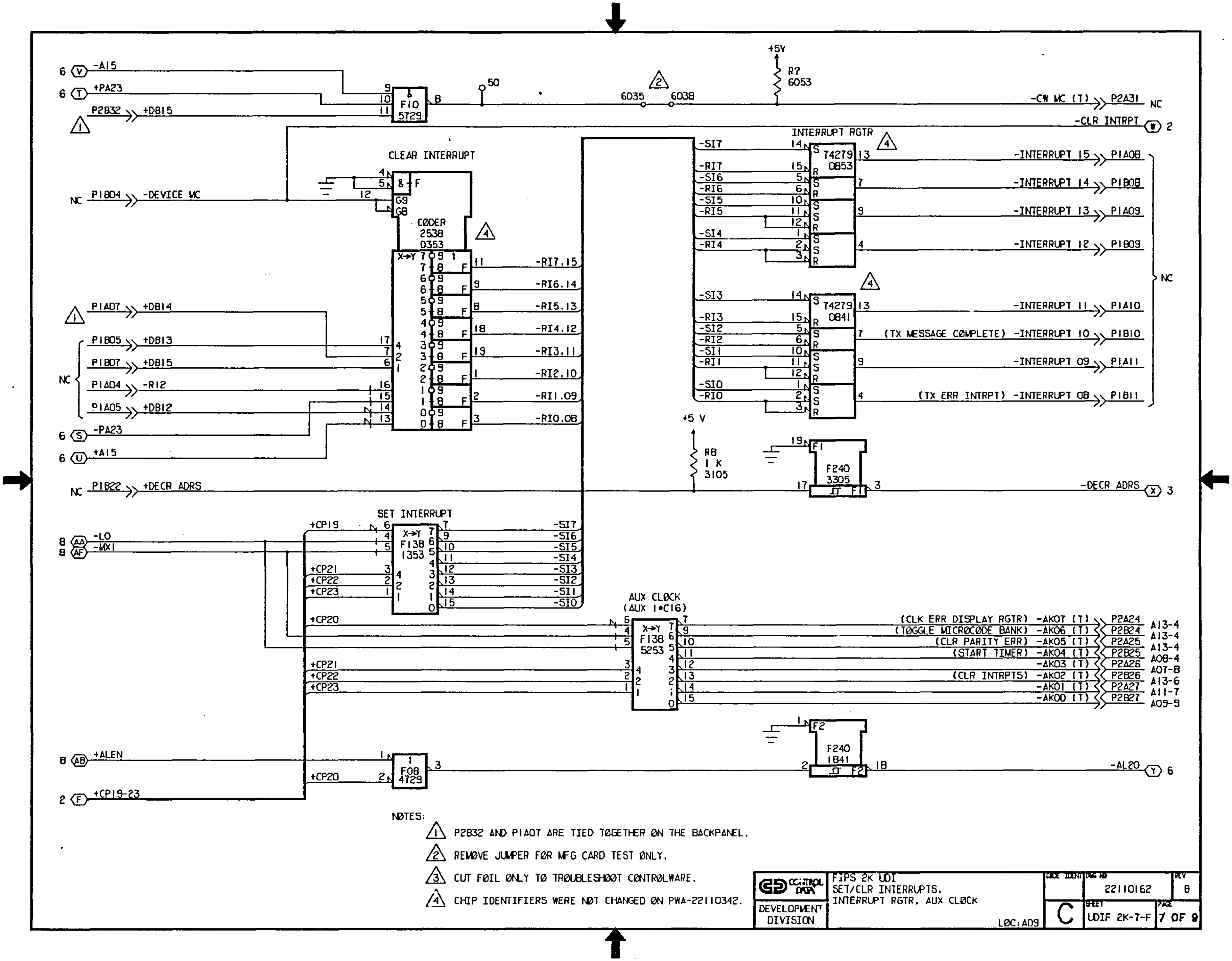


NOTES:

1. CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-22110342.
2. CONNECTIONS ARE TO BACKPANEL BUSES.

CONTROL DATA DEVELOPMENT DIVISION	FIPS 2K UDI ADDRESSABLE LATCH, ADDR 2/3 DECODE, ADDRESS TRANSMITTERS LOC:A09	CAGE IDENT C	DWG NO 22110162 SHEET UDIF 2K-6-F	REV B PAGE 6 OF 9

To present the information in this chapter in a structured format, this page has been left blank.

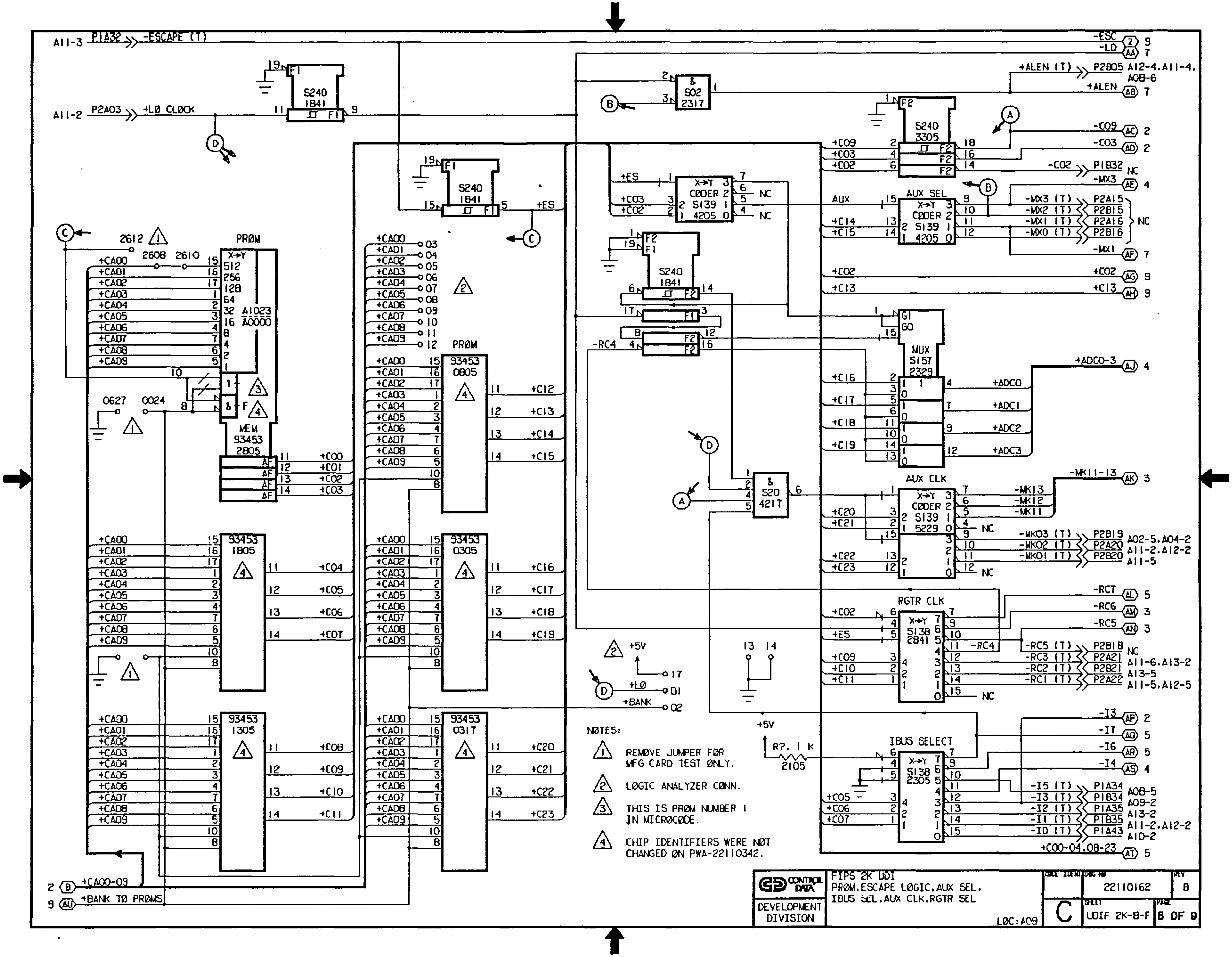


NOTES:

1. P2B32 AND P1A07 ARE TIED TOGETHER ON THE BACKPANEL.
2. REMOVE JUMPER FOR MFG CARD TEST ONLY.
3. CUT FOIL ONLY TO TROUBLESHOOT CONTROLWARE.
4. CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-22110342.

CONTROL DATA DEVELOPMENT DIVISION	FIPS 2K UDI SET/CLR INTERRUPTS, INTERRUPT RGTR, AUX CLOCK LOC:A09	C	DWG NO 22110162	REV B
			SHEET UDIF 2K-7-F	PAGE 7 OF 9

To present the information in this chapter in a structured format, this page has been left blank.

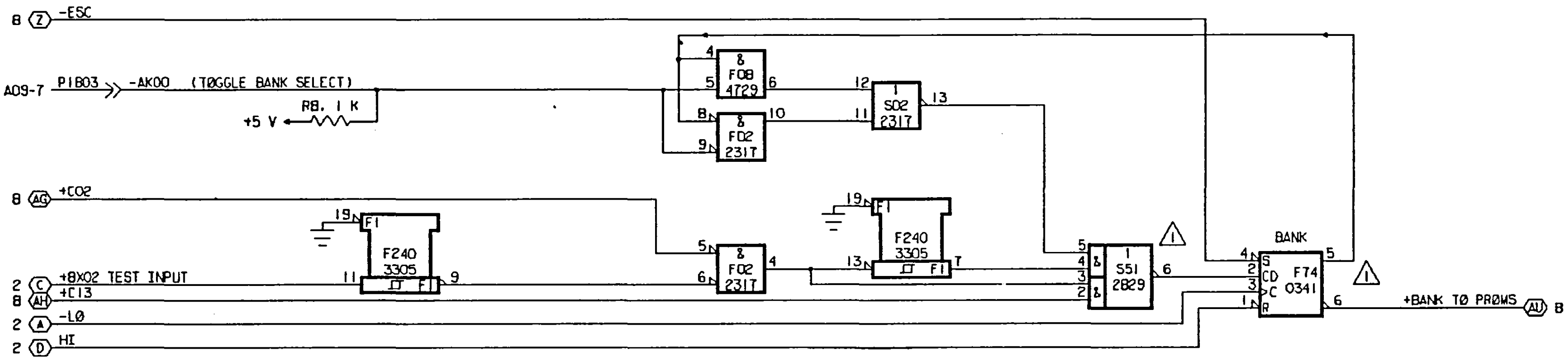


N0TES:

1. REM0VE JUMPER F0R MFG CARD TEST 0NLY.
2. L0GIC ANALYZER C0NN.
3. THIS IS PR0M NUMBER 1 IN MICR0C0DE.
4. CHIP IDENTIFIERS WERE N0T CHANGED 0N PWA-22110342.

CONTROL DATA DEVELOPMENT DIVISION	FIPS 2K UDI PR0M,ESCAPE L0GIC,AUX SEL, IBUS SEL,AUX CLK,RGTR SEL L0C:A09	C	DWG NO 22110162 SHEET UDIF 2K-8-F	REV B PAGE 8 OF 9

To present the information in this chapter in a structured format, this page has been left blank.



NOTES:

⚠1 CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-22110342.

CONTROL DATA

DEVELOPMENT DIVISION

FIPS 2K UDI

LOC:A09

CODE IDENT	DWG NO	REV
C	22110162	B
	SHEET UDIF 2K-9-F	PAGE 9 OF 9

Stream Logic (A10)

The revision levels for the Stream Logic diagrams are shown on the facing page.

PAGE					REVISION RECORD					
5	4	3	2	1	ECO	DESCRIPTION	DRFT	DATE	CHKD	APVD
A	A	A	A	A		CLASS A RELEASED	EFA	03/86	NZ	RTH
B	B	B	B	B	CA48239	ADDED COVER. RE-INTERSHEET	MES	1/26/87	NS	NS
B	C	B	C	C	CA48518	SEE NOTE 5	MES	1/30/87	NS	NS
D	D	D	D	D	CA48553	SEE NOTE 6	MES	2/5/87	NS	NS
E	D	D	D	E	CA48635	SEE C.O.	MES	2/13/87	NS	NS

NOTES:

1. THIS DOCUMENT IS CONTAINED ON MAGNETIC TAPE. MAGNETIC TAPE IS STORED IN THE EDP GROUP OF ENGINEERING SERVICES SECTION. CDED DIVISION.

2. UPDATES TO LOGIC PRINTS MUST BE PERFORMED BY CALMA.

3. THE OFF SHEET SIGNAL REFERENCES DESIGNATE THE PAGE IN THE TITLE BLOCK AREA ON DIAGRAMS.

4. THE CHIP IDENTIFIERS ON PWA-22179487 WERE CHANGED TO 'F' TYPE CHIPS. UNLESS OTHERWISE NOTED. EXAMPLE 'S74' ON PWA-53595830 IS NOW 'F74' ON PWA-22179487.

5. THE CHIP IDENTIFIERS AT LOCATIONS D4H5. D4J0. D4L7. 28L7 AND 40N2 WERE CHANGED BACK TO 'S' TYPE CHIPS. ('F157' TO 'S157')

6. THE CHIP IDENTIFIERS ON PWA-22120959 WERE CHANGED BACK TO 'S' TYPE CHIPS ('F157' TO 'S157'). UNLESS OTHERWISE NOTED.

DETACHED LISTS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN
TOLERANCES
PLACE ± PLACE ± ANGLES ±
MATERIAL
FINISH

DWN	E.F. ARLANDSON	12/85
CHKD	N. ZAK	12/85
ENGR	R.T. HENNING	03/86
MFG	B.J. REILAND	03/86
APVD	R.T. HENNING	03/86

EQUIP. NO. FR205-B

THIRD ANGLE PROJECTION

CONTROL DATA

ARDEN HILLS OPERATIONS
ST. PAUL. MINN.

TITLE

LOGIC DIAGRAM
STREAM LOGIC

PWA-22110274
PWB-22179488

SIZE C
FSCM NO. 34010
DWG NO. 22179489
A10
SHEET STREAM 1-F
PAGE 1 OF 5

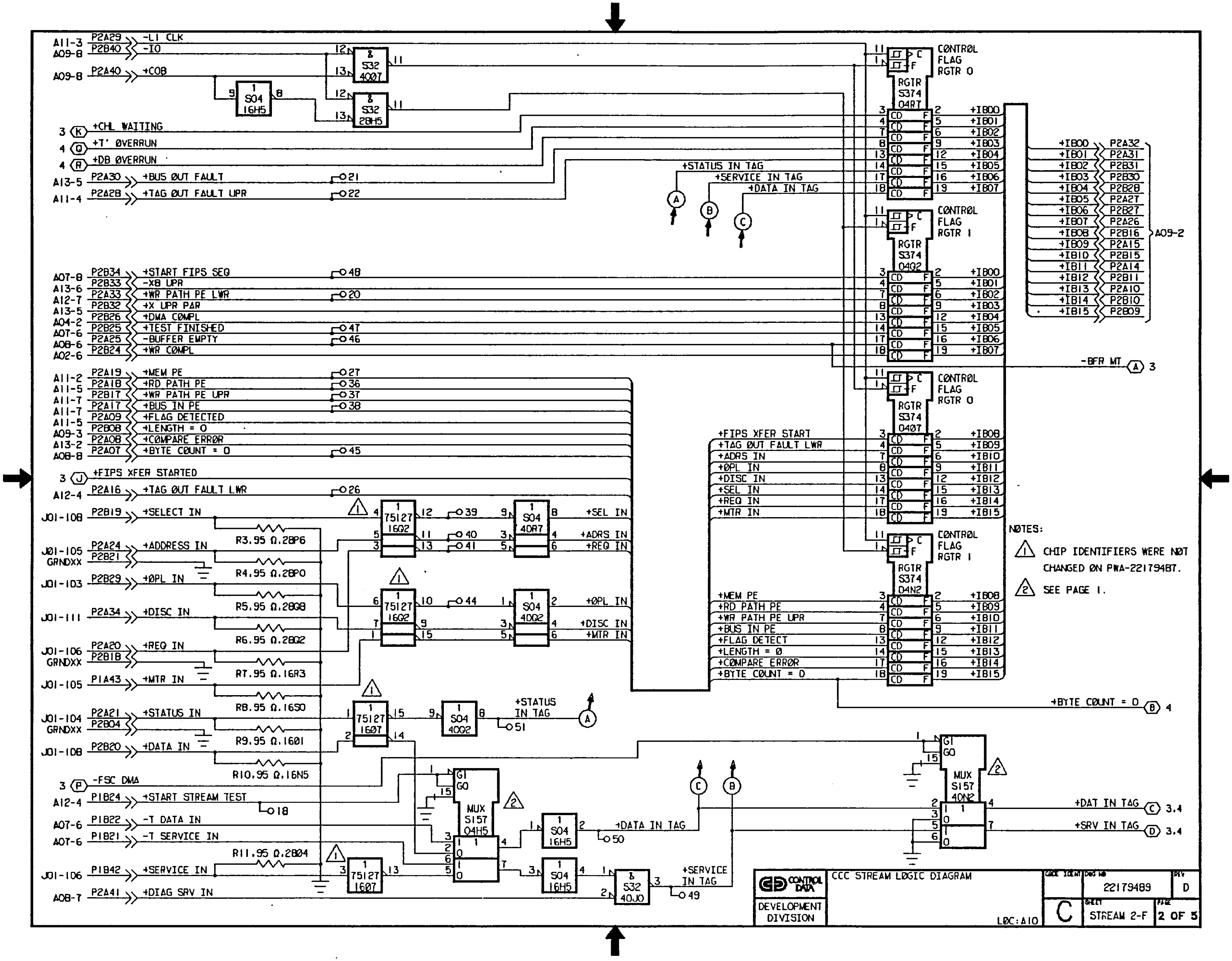
Stream Logic (A10-2)

Control Flag Registers

Various status and control signals and tag lines are clocked into control flag registers 0 and 1 by the L1 Clk signal from the data bus. When bit C08 from the UDI (A09-8) is set, control flag register 1 is enabled. If this bit is not set, control flag register 0 is enabled. The control flag register signals are sent to the I bus.

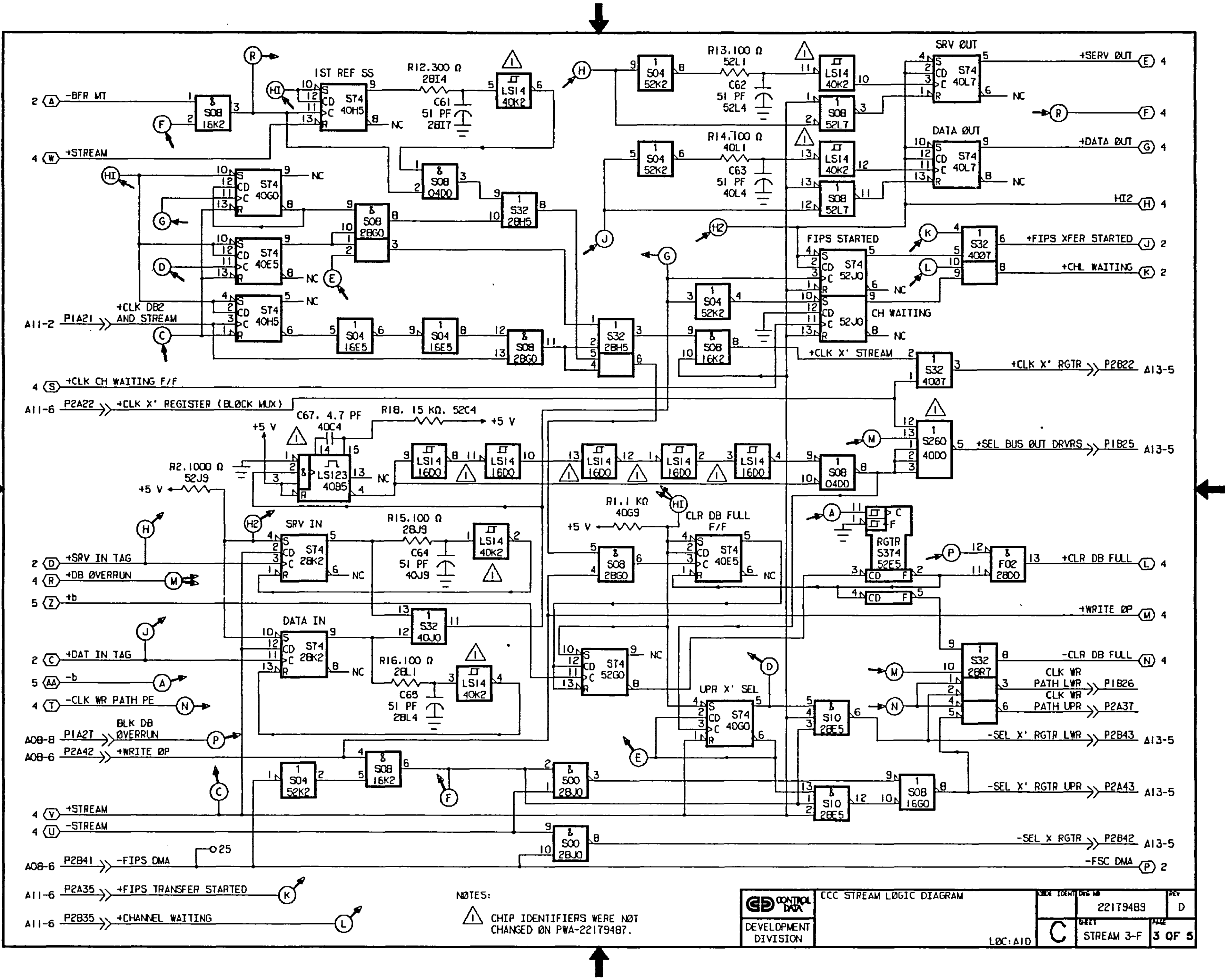
Tag Line Circuits

These circuits receive signals on the tag lines from the external FIPS device. The tag lines control information on the bus-in lines (A13-2).


A11-3 P2A29 -LI CLK
A09-8 P2B40 -IO
A09-8 P2A40 +COB
S04 16H5
S32 40Q7
S32 28H5
3 K +CHL WAITING
4 Q +T' OVERRUN
4 R +DB OVERRUN
A13-5 P2A30 +BUS OUT FAULT 21
A11-4 P2A28 +TAG OUT FAULT UPR 22
+STATUS IN TAG
+SERVICE IN TAG
+DATA IN TAG
CONTROL FLAG RGTR 0
RGTR S374 04R7
CONTROL FLAG RGTR 1
RGTR S374 04Q2
CONTROL FLAG RGTR 0
RGTR S374 04Q7
CONTROL FLAG RGTR 1
RGTR S374 04N2
+IB00 +IB01 +IB02 +IB03 +IB04 +IB05 +IB06 +IB07
+IB08 +IB09 +IB10 +IB11 +IB12 +IB13 +IB14 +IB15
+IB00 P2A32
+IB01 P2A31
+IB02 P2B31
+IB03 P2B30
+IB04 P2B28
+IB05 P2A27
+IB06 P2B27
+IB07 P2A26
+IB08 P2B16
+IB09 P2A15
+IB10 P2B15
+IB11 P2A14
+IB12 P2B11
+IB13 P2A10
+IB14 P2B10
+IB15 P2B09
A09-2
A07-8 P2B34 +START FIPS SEQ 48
A13-6 P2B33 -X8 UPR
A12-7 P2A33 +WR PATH PE LWR 20
A13-5 P2B32 +X UPR PAR
A04-2 P2B26 +DMA COMPL
A07-6 P2B25 +TEST FINISHED 47
A08-6 P2A25 -BUFFER EMPTY 46
A02-6 P2B24 +WR COMPL
-BFR MT A 3
A11-2 P2A19 +MEM PE 27
A11-5 P2A18 +RD PATH PE 36
A11-7 P2B17 +WR PATH PE UPR 37
A11-7 P2A17 +BUS IN PE 38
A11-5 P2A09 +FLAG DETECTED
A09-3 P2B08 +LENGTH = 0
A13-2 P2A08 +COMPARE ERROR
A08-8 P2A07 +BYTE COUNT = 0 45
3 J +FIPS XFER STARTED
A12-4 P2A16 +TAG OUT FAULT LWR 26
+FIPS XFER START
+TAG OUT FAULT LWR
+ADRS IN
+OPL IN
+DISC IN
+SEL IN
+REQ IN
+MTR IN
J01-108 P2B19 +SELECT IN
75127 16Q2
39 40 41
S04 40R7
+SEL IN
+ADRS IN
+REQ IN
J01-105 P2A24 +ADDRESS IN
GRNDXX P2B21
R3,95 Ω,28P6
R4,95 Ω,28P0
J01-103 P2B29 +OPL IN
R5,95 Ω,28Q8
J01-111 P2A34 +DISC IN
R6,95 Ω,28Q2
J01-106 P2A20 +REQ IN
GRNDXX P2B18
R7,95 Ω,16R3
J01-105 P1A43 +MTR IN
R8,95 Ω,16S0
J01-104 P2A21 +STATUS IN
GRNDXX P2B04
R9,95 Ω,16Q1
J01-108 P2B20 +DATA IN
R10,95 Ω,16N5
75127 16Q2
44
S04 40Q2
+OPL IN
+DISC IN
+MTR IN
75127 16Q7
S04 40Q2
+STATUS IN TAG
51
+MEM PE
+RD PATH PE
+WR PATH PE UPR
+BUS IN PE
+FLAG DETECT
+LENGTH = 0
+COMPARE ERROR
+BYTE COUNT = 0
+BYTE COUNT = 0 B 4
NOTES:
CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-22179487.
SEE PAGE 1.
3 P -FSC DMA
A12-4 P1B24 +START STREAM TEST 18
A07-6 P1B22 -T DATA IN
A07-6 P1B21 -T SERVICE IN
R11,95 Ω,28Q4
J01-106 P1B42 +SERVICE IN
75127 16Q7
A08-7 P2A41 +DIAG SRV IN
G1 G0 MUX S157 04H5
S04 16H5
+DATA IN TAG
50
S04 16H5
S32 40J0
+SERVICE IN TAG
49
G1 G0 MUX S157 40N2
+DAT IN TAG C 3.4
+SRV IN TAG D 3.4
CONTROL DATA
DEVELOPMENT DIVISION
CCC STREAM LOGIC DIAGRAM
LOC:A10
C
22179489
D
STREAM 2-F
2 OF 5

Stream Logic (A10-3)

The CCC Stream Logic diagram (location A10-3) is shown on the facing page.



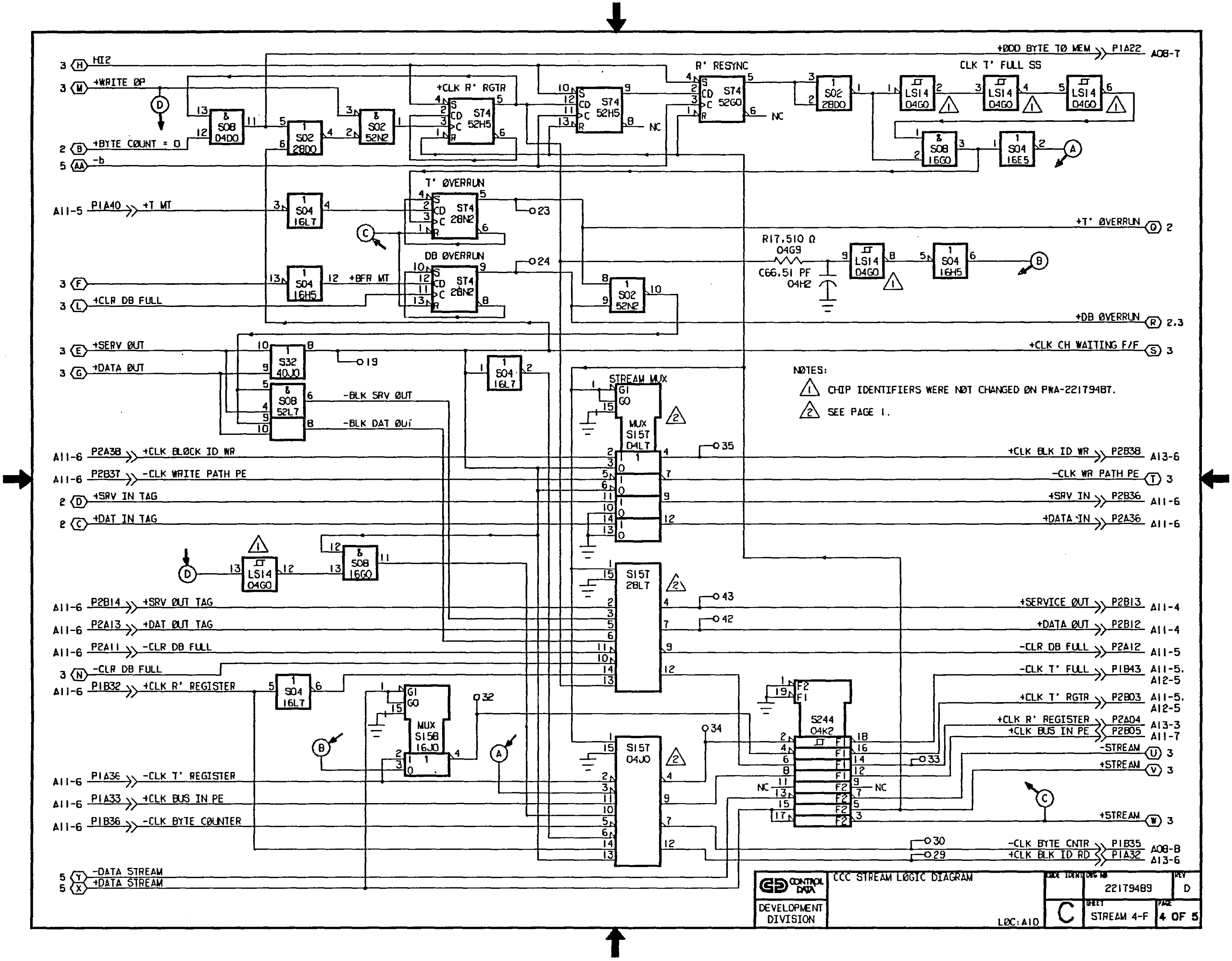
NOTES:

⚠1 CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-22179487.

CONTROL DATA
DEVELOPMENT DIVISION
CCC STREAM LOGIC DIAGRAM
LOC:A10
DWG NO 22179489
REV D
C
SHEET STREAM 3-F
PAGE 3 OF 5

Stream Logic (A10-4)

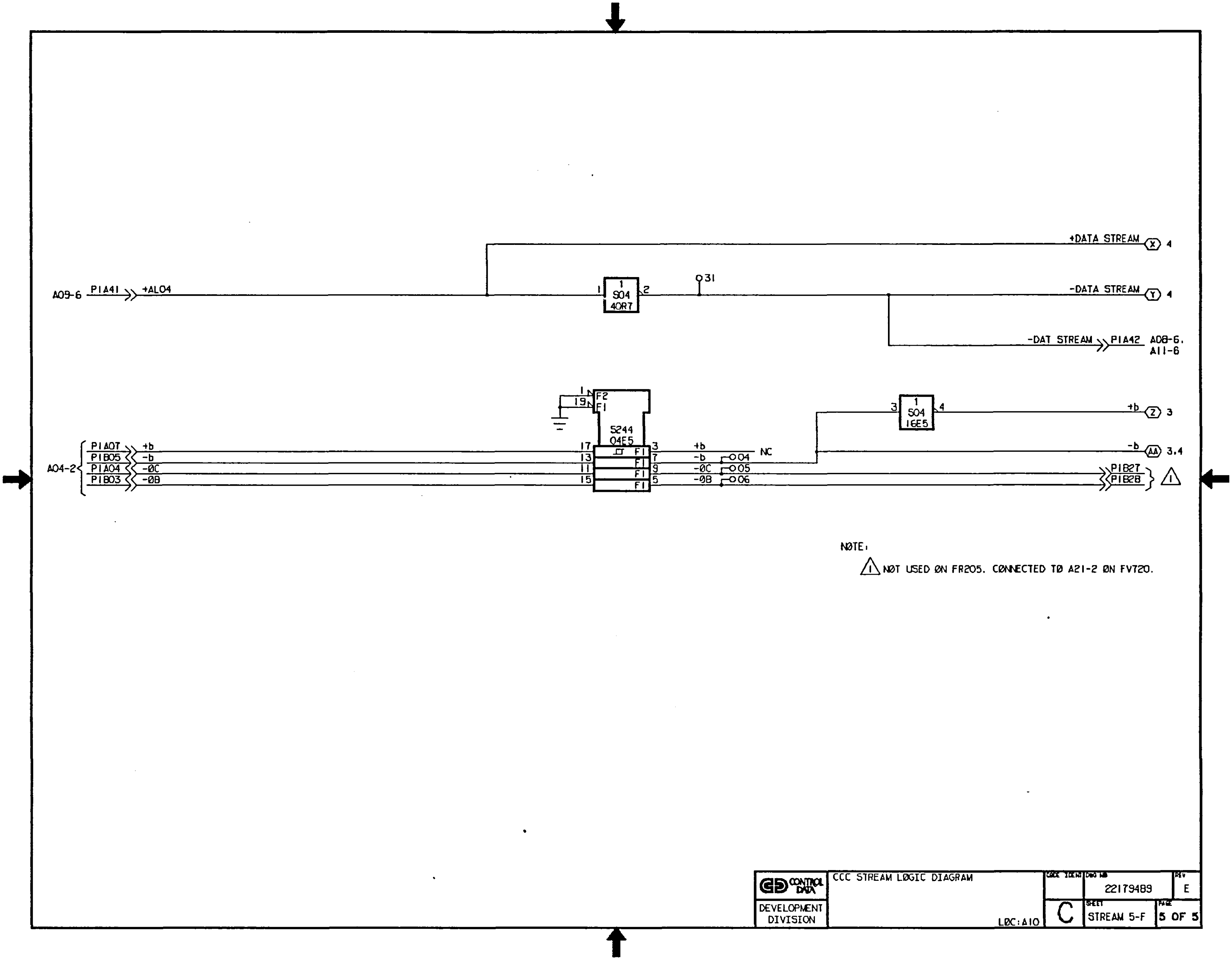
The CCC Stream Logic diagram (location A10-4) is shown on the facing page.



3 H HI2
3 M +WRITE ØP
2 B +BYTE CØUNT = 0
5 AA -b
A11-5 P1A40 +T MT
3 F
3 L +CLR DB FULL
3 E +SERV ØUT
3 G +DATA ØUT
A11-6 P2A38 +CLK BLØCK ID WR
A11-6 P2B37 -CLK WRITE PATH PE
2 D +SRV IN TAG
2 C +DAT IN TAG
A11-6 P2B14 +SRV ØUT TAG
A11-6 P2A13 +DAT ØUT TAG
A11-6 P2A11 -CLR DB FULL
3 N -CLR DB FULL
A11-6 P1B32 +CLK R' REGISTER
A11-6 P1A36 -CLK T' REGISTER
A11-6 P1A33 +CLK BUS IN PE
A11-6 P1B36 -CLK BYTE CØUNTER
5 Y -DATA STREAM
5 X +DATA STREAM
+CLK R' RGTR
R' RESYNC
CLK T' FULL SS
T' ØVERRUN
DB ØVERRUN
+BFR MT
R17,510 Ω 04G9
C66,51 PF 04H2
-BLK SRV ØUT
-BLK DAT ØUT
STREAM MUX
MUX S157 04LT
S157 28LT
S157 04J0
MUX S158 16J0
S244 04K2
S08 04D0
S02 28D0
S02 52N2
S74 52H5
S74 52G0
S02 28D0
LS14 04G0
S08 16G0
S04 16E5
S04 16L7
S74 28N2
S04 16H5
S32 40J0
S08 52L7
S02 52N2
S08 16G0
23
24
19
35
43
42
32
34
33
30
29
NC
+ØDD BYTE TØ MEM P1A22 A08-T
+T' ØVERRUN Q 2
+DB ØVERRUN R 2,3
+CLK CH WAITING F/F S 3
+CLK BLK ID WR P2B38 A13-6
-CLK WR PATH PE T 3
+SRV IN P2B36 A11-6
+DATA IN P2A36 A11-6
+SERVICE ØUT P2B13 A11-4
+DATA ØUT P2B12 A11-4
-CLR DB FULL P2A12 A11-5
-CLK T' FULL P1B43 A11-5, A12-5
+CLK T' RGTR P2B03 A11-5, A12-5
+CLK R' REGISTER P2A04 A13-3
+CLK BUS IN PE P2B05 A11-7
-STREAM U 3
+STREAM V 3
+STREAM W 3
-CLK BYTE CNTR P1B35 A08-8
+CLK BLK ID RD P1A32 A13-6
NØTES:
1 CHIP IDENTIFIERS WERE NØT CHANGED ØN PWA-22179487.
2 SEE PAGE 1.
CONTROL DATA
DEVELOPMENT DIVISION
CCC STREAM LØGIC DIAGRAM
22179489
D
C
STREAM 4-F
4 OF 5
LØC:A10

Stream Logic (A10-5)

The CCC Stream Logic diagram (location A10-5) is shown on the facing page.


A09-6
P1A41
+AL04
1
S04
40R7
1
2
31
+DATA STREAM
X
4
-DATA STREAM
Y
4
-DAT STREAM
P1A42
A08-6,
A11-6
A04-2
P1A07
+b
P1B05
-b
P1A04
-0C
P1B03
-0B
1
19
F2
F1
5244
04E5
17
13
11
15
F1
3
7
9
5
+b
-b
-0C
-0B
NC
04
05
06
3
1
S04
16E5
4
+b
Z
3
-b
AA
3,4
P1B27
P1B28
1
NOTE:
1 NOT USED ON FR205. CONNECTED TO A21-2 ON FV720.
CONTROL DATA
DEVELOPMENT DIVISION
CCC STREAM LOGIC DIAGRAM
LOC:A10
C
22179489
E
STREAM 5-F
5 OF 5

FIPS Interface – III (A11)

The revision levels for the FIPS Interface – III diagrams (location A11) are shown on the facing page.

PAGE							REVISION RECORD					
T	6	5	4	3	2	1	ECO	DESCRIPTION	DRFT	DATE	CHKD	APVD
A	A	A	A	A	A	A		CLASS A RELEASED	EFA	12/85	NZ	RTH
B	B	B	B	B	B	B	CA47702	SEE NOTE 4	MES	8/13/86	NS	NS
C	C	C	C	C	C	C	CA48239	ADDED COVER, RE-INTERSHEET	MES	1/28/87	NS	NS

NOTES:

1. THIS DOCUMENT IS CONTAINED ON MAGNETIC TAPE. MAGNETIC TAPE IS STORED IN THE EDP GROUP OF ENGINEERING SERVICES SECTION,CDED DIVISION.
2. UPDATES TO LOGIC PRINTS MUST BE PERFORMED BY CALMA.
3. THE OFF SHEET SIGNAL REFERENCES DESIGNATE THE PAGE IN THE TITLE BLOCK AREA ON DIAGRAMS.
4. THE CHIP IDENTIFIERS ON PWA-53590866 WERE CHANGED TO 'F' TYPE CHIPS. UNLESS OTHERWISE NOTED. EXAMPLE '5T4' ON PWA-53590794 IS NOW 'F74' ON PWA-53590866.

DETACHED LISTS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN
TOLERANCES
PLACE ± PLACE ± ANGLES ±
MATERIAL
FINISH

DWN	E F ARLANDSON	12/85
CHKD	N ZAK	12/85
ENGR	R T HENNING	02/86
MFG	B J REILAND	02/86
APVD	R T HENNING	02/86

EQUIP. NO. FR205-B

THIRD ANGLE PROJECTION

CONTROL DATA

ARDEN HILLS OPERATIONS
ST. PAUL, MINN.

TITLE

LOGIC DIAGRAM
FIPS I/F 3

PWA-53590866 PWB-53590867

SIZE	FSCM NO.	DWG NO.
C	34010	53590868

A11 SHEET IF III 1-F PAGE 1 OF 7

FIPS Interface - III (A11-2)

Data Bus Drivers

During a coupler read operation, the upper 8-bit byte (bits T1 through T8) from the T register (A11-5) is transferred from the drivers to the data bus on the bidirectional data lines. The 8-bit byte is then written into memory (A07-3).

Data Bus Receivers

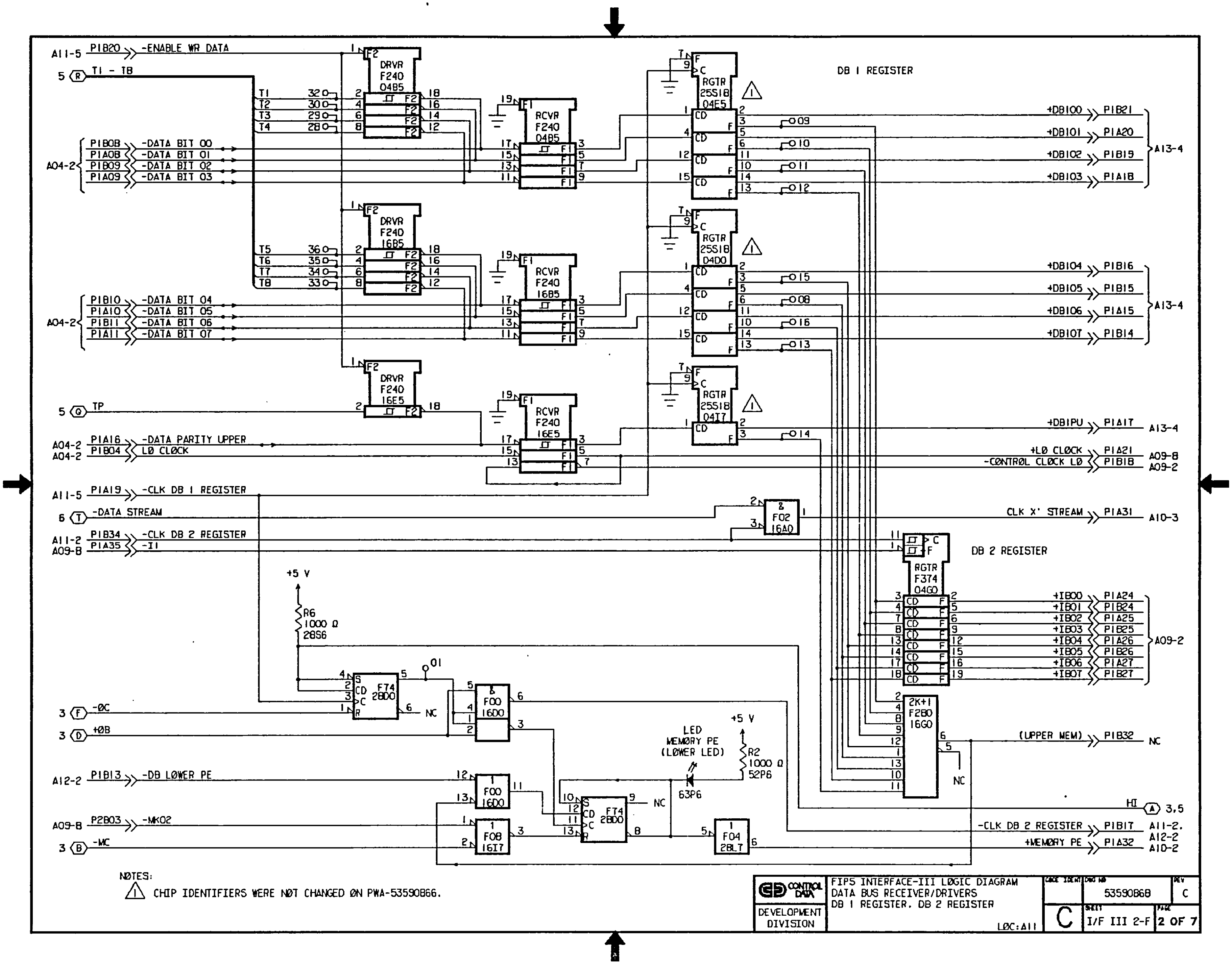
During a coupler write operation, the upper 8-bit byte (bits 00 through 07) is transferred from the data bus to the receivers on the same bidirectional lines used by the data bus drivers. The data bus receivers then send the 8-bit byte to the DB1 register.

Data Bus Registers (DB1, DB2)

The upper data bus byte from the data bus receivers is clocked into the DB1 register by the Clk DB1 Register signal from the memory control circuit (A11-5). This signal is also used to generate the Clk DB2 Register signal (A11-2) that clocks the upper data byte from the DB1 register to the multiplexer (A13-4) and into the DB2 register to the I bus as bits IB00 through IB07.

Data Bus Parity Check Circuit

This circuit performs an odd parity check of the upper data bus byte and associated parity bit. The memory parity error LED indicator is not used.



NOTES:

⚠ CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-53590866.

CONTROL DATA
DEVELOPMENT DIVISION

FIPS INTERFACE-III LOGIC DIAGRAM
DATA BUS RECEIVER/DRIVERS
DB 1 REGISTER. DB 2 REGISTER

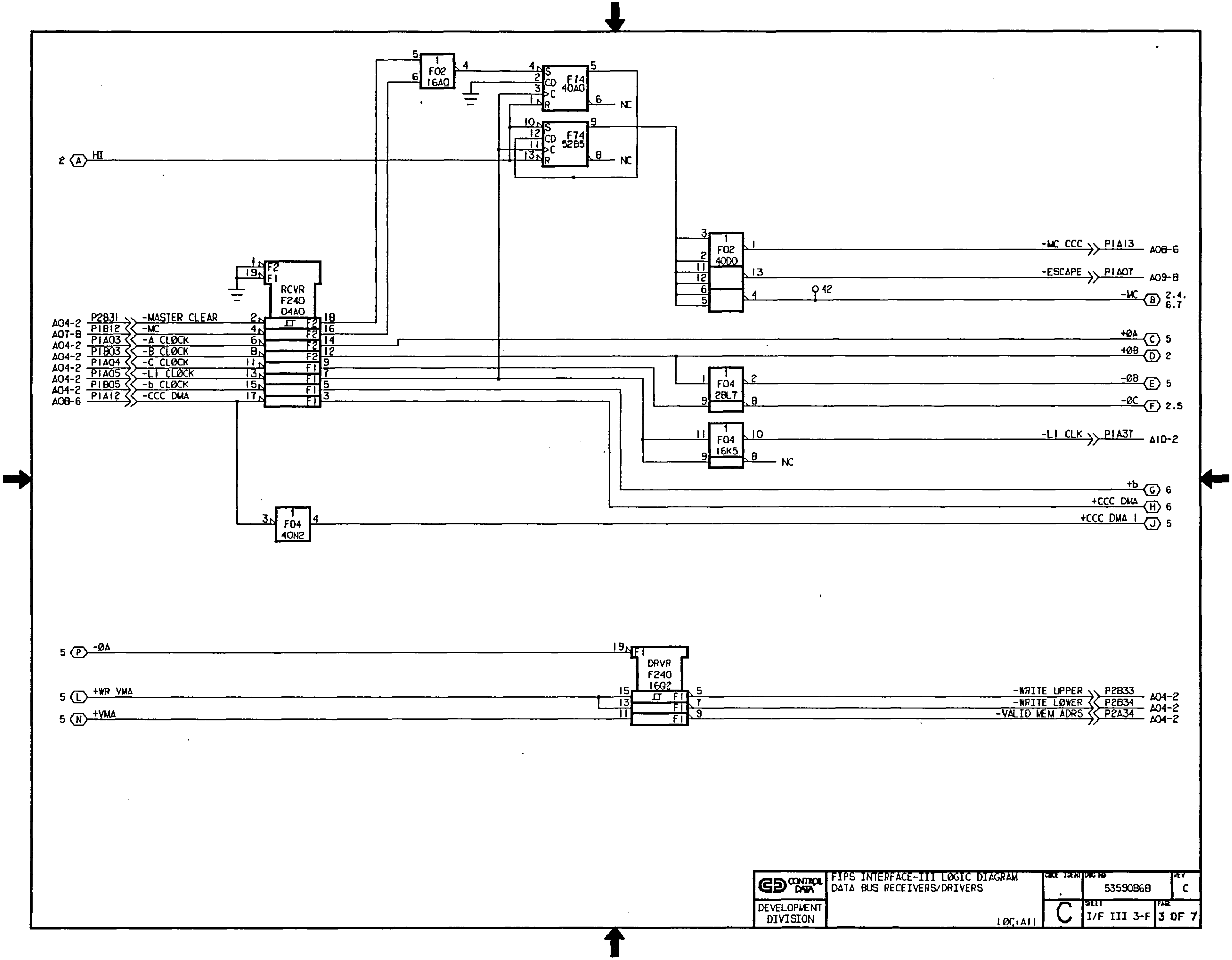
LOC:A11

CAGE IDENT	DWG NO	REV
C	53590868	C
	SHEET I/F III 2-F	PAGE 2 OF 7

FIPS Interface - III (A11-3)

Data Bus Receivers/Drivers

Various clocks and signals, including data bus access time clocks for the FIPS interface, processor, and CYBER interface (A, B, and C clocks) and master clear are received from the data bus or transmitted to the data bus via the data bus receivers/drivers.



CONTROL DATA
DEVELOPMENT DIVISION

FIPS INTERFACE-III LØGIC DIAGRAM
DATA BUS RECEIVERS/DRIVERS

LØC:A11

DWG NO 53590868
REV C
C
SHEET I/F III 3-F
PAGE 3 OF 7

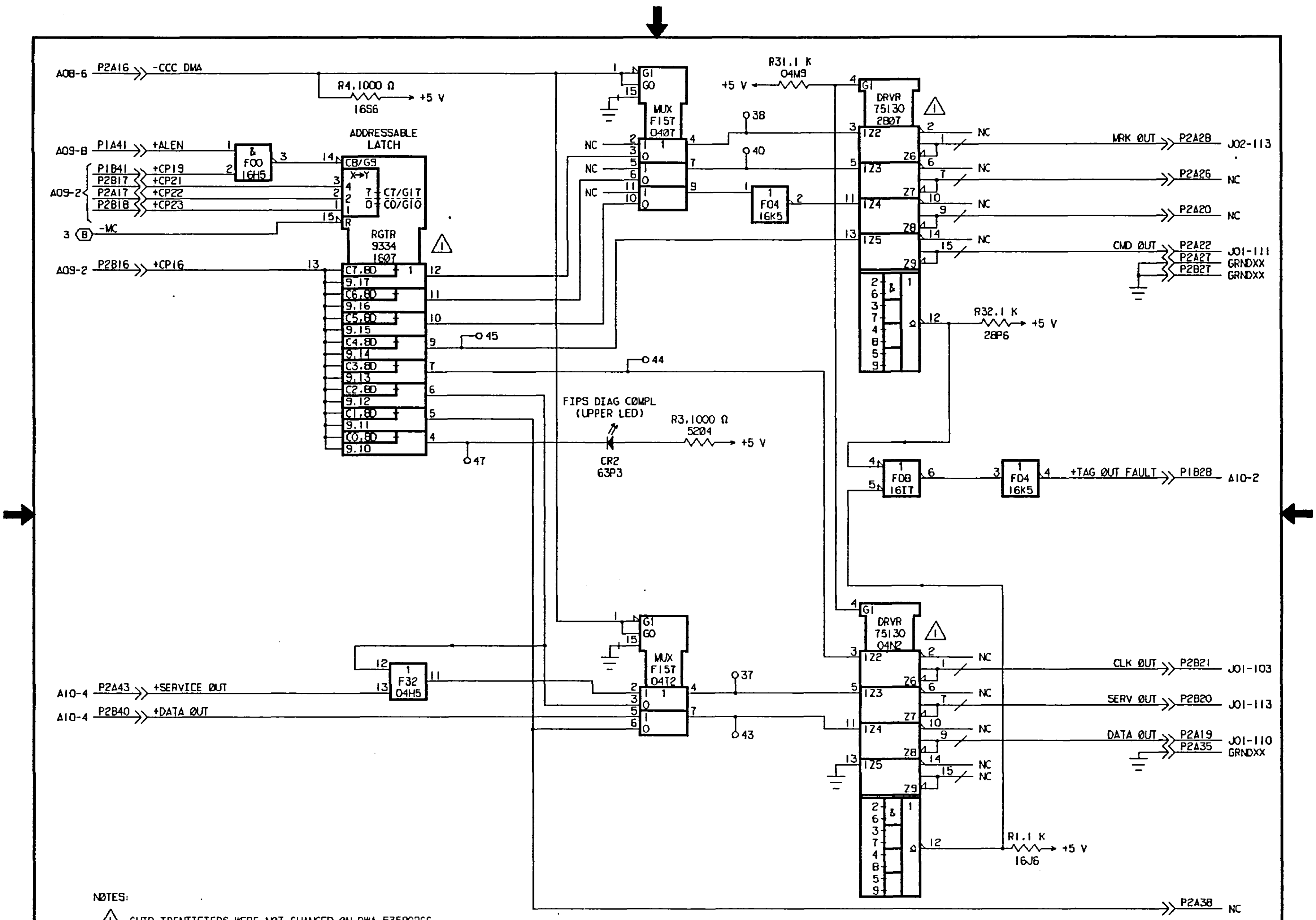
FIPS Interface - III (A11-4)

Addressable Latch Register

The outputs of the addressable latch register are selected by microcode bits CP19, CP21, CP22, and CP23 from the FIPS interface UDI sequencer (A09-2). The register outputs are sent via the multiplexer circuits to the tag transmitters. The associated LED indicator (CR2) is not used and remains unlit.

Tag Transmitters

These circuits transmit signals on the tag lines to the external FIPS device. The tag lines control the information that is present on the bus-out lines (A13-5).



NØTES:

⚠1 CHIP IDENTIFIERS WERE NØT CHANGED ØN PWA-53590866.

CD CONTROL DATA

DEVELOPMENT DIVISION

FIPS INTERFACE-III LØGIC DIAGRAM
TAG TRANSMITTERS

LØC:A11

53590868

C

C

I/F III 4-F

4 OF 7

FIPS Interface - III (A11-5)

T Register

The upper 8-bit byte of assembly/disassembly information (bits AD00 through AD07) is clocked into the T register during a UDI read operation. The read data bits (T1 through T8) in the T register are then sent to the data bus drivers (A11-2) and to the parity generator.

T' Register

The upper 8-bit byte of data bus information (data in bits 00 through 07) is clocked into the T' register during a DMA read operation. The read data bits (T1 through T8) are sent to the parity generator (A11-5) and to the data bus drivers (A11-2).

Parity Generation

A parity bit is generated on the data from the T or T' register. This parity bit (TP) is sent to the data bus driver (A11-2) along with the read data bits (T1 through T8). The parity generator also sends a parity bit to the parity check circuit (A11-5).

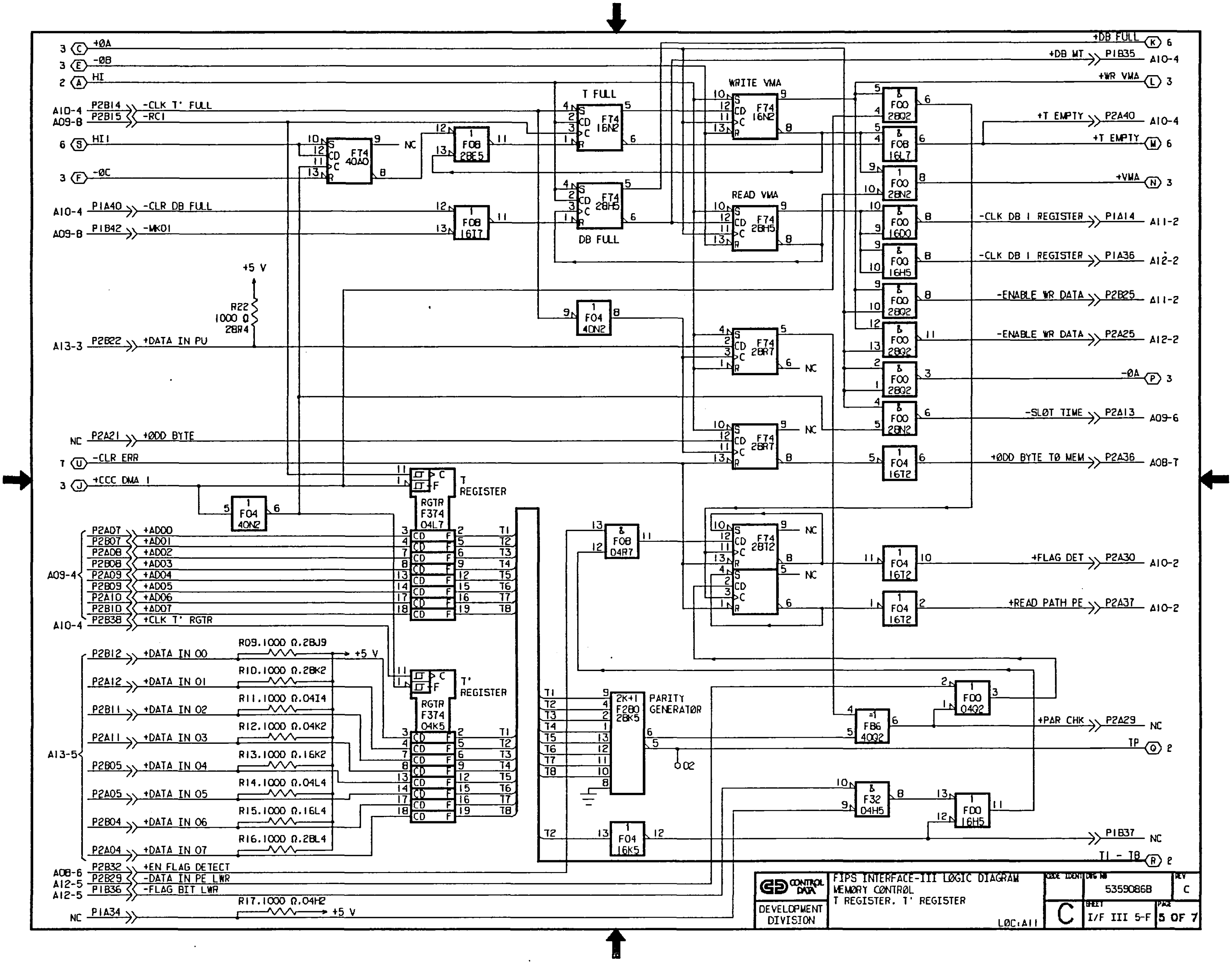
Parity Check Circuit

This circuit compares the DMA read data parity bit (data in PU) with the parity bit generated from the DMA read data after it passes through the T' register. A Read Path PE signal is sent to the control flag register (A10-2) if an error occurs in transmission of DMA read data.

Memory Control

The T full and write valid memory address (VMA) FFs provide the timing signals necessary to write data into memory (A07).

The data bus (DB) full and read VMA FFs provide the timing signals necessary to read data from memory (A07).



CONTROL DATA
DEVELOPMENT DIVISION
FIPS INTERFACE-III LØGIC DIAGRAM
MEMØRY CØNTRØL
T REGISTER, T' REGISTER
LØC:A11
DWG NO 53590868
REV C
C
SHEET I/F III 5-F
PAGE 5 OF 7

FIPS Interface - III (A11-6)

Buffer Full

A Buffer Full signal is generated by the transfer logic (A08-4) to allow DMA data to be written into the memory buffer until it is full.

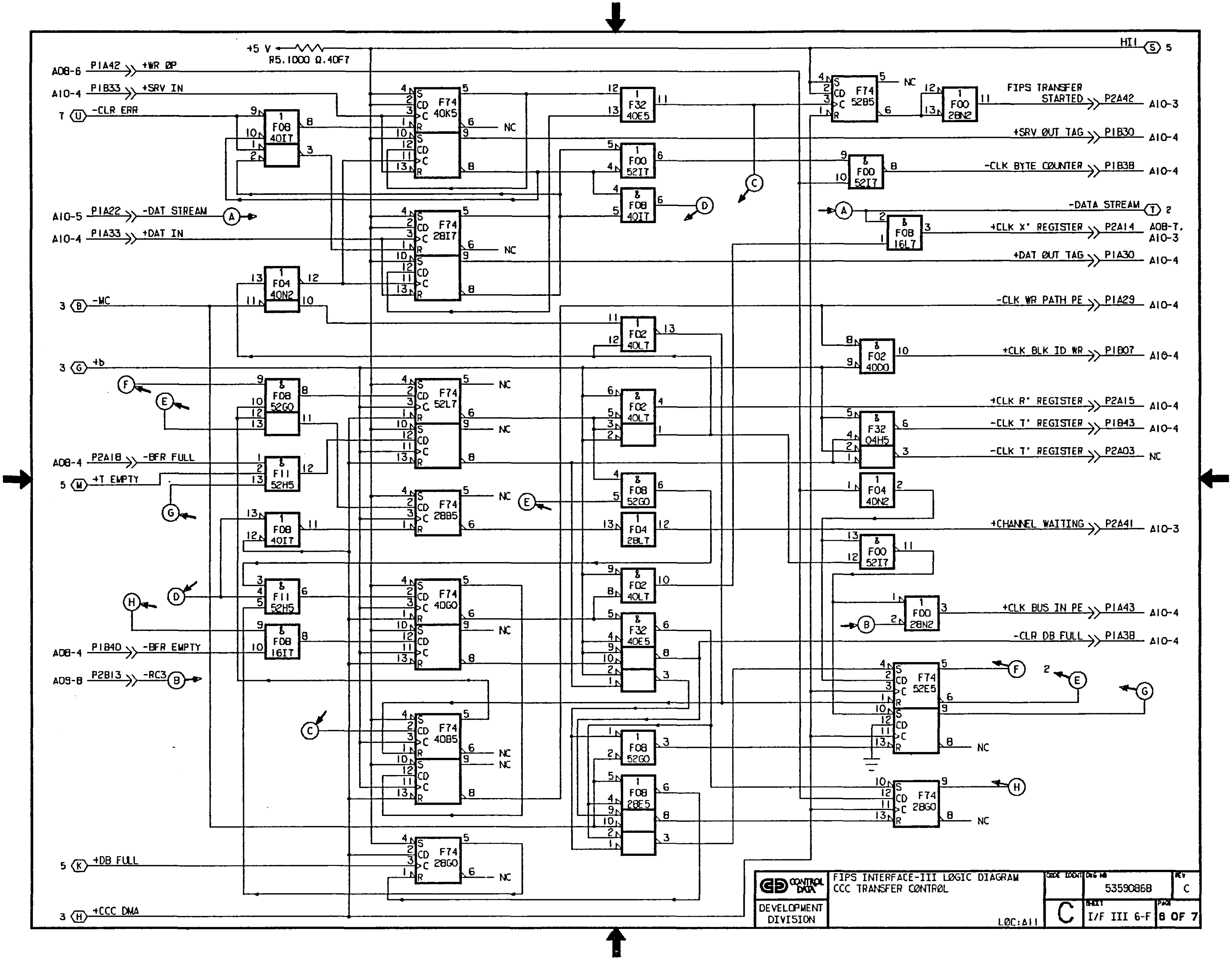
Buffer Empty

The Buffer Empty signal is generated by the transfer logic (A08-4) to allow DMA data to be read from the memory buffer until it is empty.

Transfer Control

The transfer control logic uses various input signals including the Buffer Full and Buffer Empty signals to generate control signals and clocks necessary to transfer DMA data between the CYBER interface and the FIPS interface.

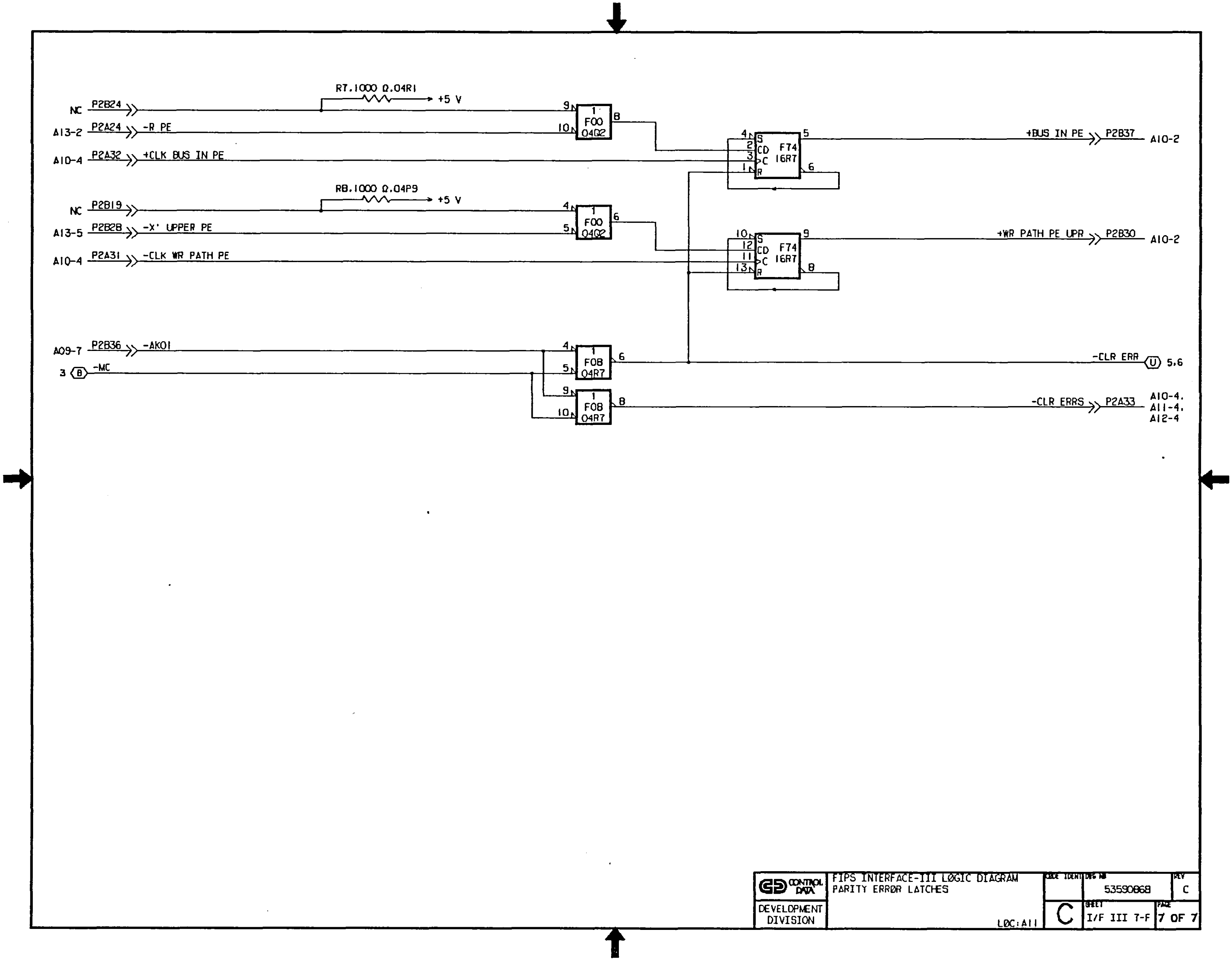
The X' register clock is used for a DMA write operation and the R' and T' register clocks are used for a DMA read operation. The byte counter and block ID clocks are used for both read and write operations. The FIPS Transfer Started and Channel Waiting signals are sent to the control flag register of the stream logic (A10-3, A10-2).


+5 V
R5.1000 Ω.40F7
HI1
S 5
A08-6 P1A42 +WR ØP
A10-4 P1B33 +SRV IN
7 U -CLR ERR
A10-5 P1A22 -DAT STREAM
A10-4 P1A33 +DAT IN
3 B -MC
3 G +b
A08-4 P2A18 -BFR FULL
5 M +T EMPTY
A08-4 P1B40 -BFR EMPTY
A09-8 P2B13 -RC3
5 K +DB FULL
3 H +CCC DMA
FIPS TRANSFER STARTED P2A42 A10-3
+SRV ØUT TAG P1B30 A10-4
-CLK BYTE CØUNTER P1B38 A10-4
-DATA STREAM T 2
+CLK X' REGISTER P2A14 A08-T, A10-3
+DAT ØUT TAG P1A30 A10-4
-CLK WR PATH PE P1A29 A10-4
+CLK BLK ID WR P1B07 A10-4
+CLK R' REGISTER P2A15 A10-4
-CLK T' REGISTER P1B43 A10-4
-CLK T' REGISTER P2A03 NC
+CHANNEL WAITING P2A41 A10-3
+CLK BUS IN PE P1A43 A10-4
-CLR DB FULL P1A38 A10-4
F74 40K5
F74 28I7
F74 52L7
F74 28B5
F74 40G0
F74 40B5
F74 28G0
F74 52B5
F74 52E5
F08 40I1
F04 40N2
F08 52G0
F11 52H5
F08 40I1
F08 16I1
F32 40E5
F00 52I1
F08 40I1
F02 40L7
F08 52G0
F04 28L7
F32 40E5
F08 52G0
F08 28E5
F00 28N2
F00 52I7
F08 16L7
F02 40D0
F32 04H5
F04 40N2
F00 52I7
F00 28N2
NC
A B C D E F G H
FIPS INTERFACE-III LØGIC DIAGRAM
CCC TRANSFER CØNTRØL
CONTROL DATA
DEVELOPMENT DIVISION
LØC:A11
CODE IDENT
DWG NO 53590868
REV C
C
SHEET I/F III 6-F
PAGE 8 OF 7

FIPS Interface - III (A11-7)

Parity Error Latches

These two latches (FFs) hold some of the parity errors that may occur during read and write operations. The parity error signals are sent from the FFs to the control flag register of the stream logic (A10-2).



CONTROL DATA
DEVELOPMENT DIVISION

FIPS INTERFACE-III LØGIC DIAGRAM
PARITY ERRØR LATCHES

LØC:A11

CODE IDENT: C
DWG NO: 53590868
REV: C
SHEET: I/F III 7-F
PAGE: 7 OF 7

FIPS Interface – III (A12)

The revision levels for the FIPS Interface – III diagrams (location A12) are shown on the facing page (A12-1)

PAGE							REVISION RECORD					
7	6	5	4	3	2	1	ECO	DESCRIPTION	DRFT	DATE	CHKD	APVD
A	A	A	A	A	A	A		CLASS A RELEASED	EFA	12/85	NZ	RTH
B	B	B	B	B	B	B	CA47702	SEE NOTE 4	WES	8/13/86	NS	NS
C	C	C	C	C	C	C	CA48239	ADDED COVER, RE-INTERSHEET	WES	1/28/87	NS	NS

NOTES:

1. THIS DOCUMENT IS CONTAINED ON MAGNETIC TAPE. MAGNETIC TAPE IS STORED IN THE EDP GROUP OF ENGINEERING SERVICES SECTION,CDED DIVISION.
2. UPDATES TO LOGIC PRINTS MUST BE PERFORMED BY CALMA.
3. THE OFF SHEET SIGNAL REFERENCES DESIGNATE THE PAGE IN THE TITLE BLOCK AREA ON DIAGRAMS.
4. THE CHIP IDENTIFIERS ON PWA-53590866 WERE CHANGED TO 'F' TYPE CHIPS, UNLESS OTHERWISE NOTED. EXAMPLE 'S74' ON PWA-53590794 IS NOW 'FT4' ON PWA-53590866.

DETACHED LISTS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN
TOLERANCES
PLACE ± PLACE ± ANGLES ±
MATERIAL
FINISH

DWN	E F ARLANDSON	12/85
CHKD	N ZAK	12/85
ENGR	R T HENNING	02/86
MFG	B J REILAND	02/86
APVD	R T HENNING	02/86

EQUIP. NO. FR205-B

THIRD ANGLE PROJECTION

CONTROL DATA

ARDEN HILLS OPERATIONS
ST. PAUL, MINN.

TITLE
LOGIC DIAGRAM
FIPS I/F 3

PWA-53590866
PWB-53590867

SIZE C
FSCM NO. 34010
DWG NO. 53590868

A12
SHEET IF III 1-BF
PAGE 1 OF 7

FIPS Interface - III (A12-2)

Data Bus Drivers

During a coupler read operation, the lower 8-bit byte (bits T1 through T8) from the T register (A12-5) is sent from the drivers to the data bus on bidirectional pins. The 8-bit byte is then written into memory (A07-3).

Data Bus Receivers

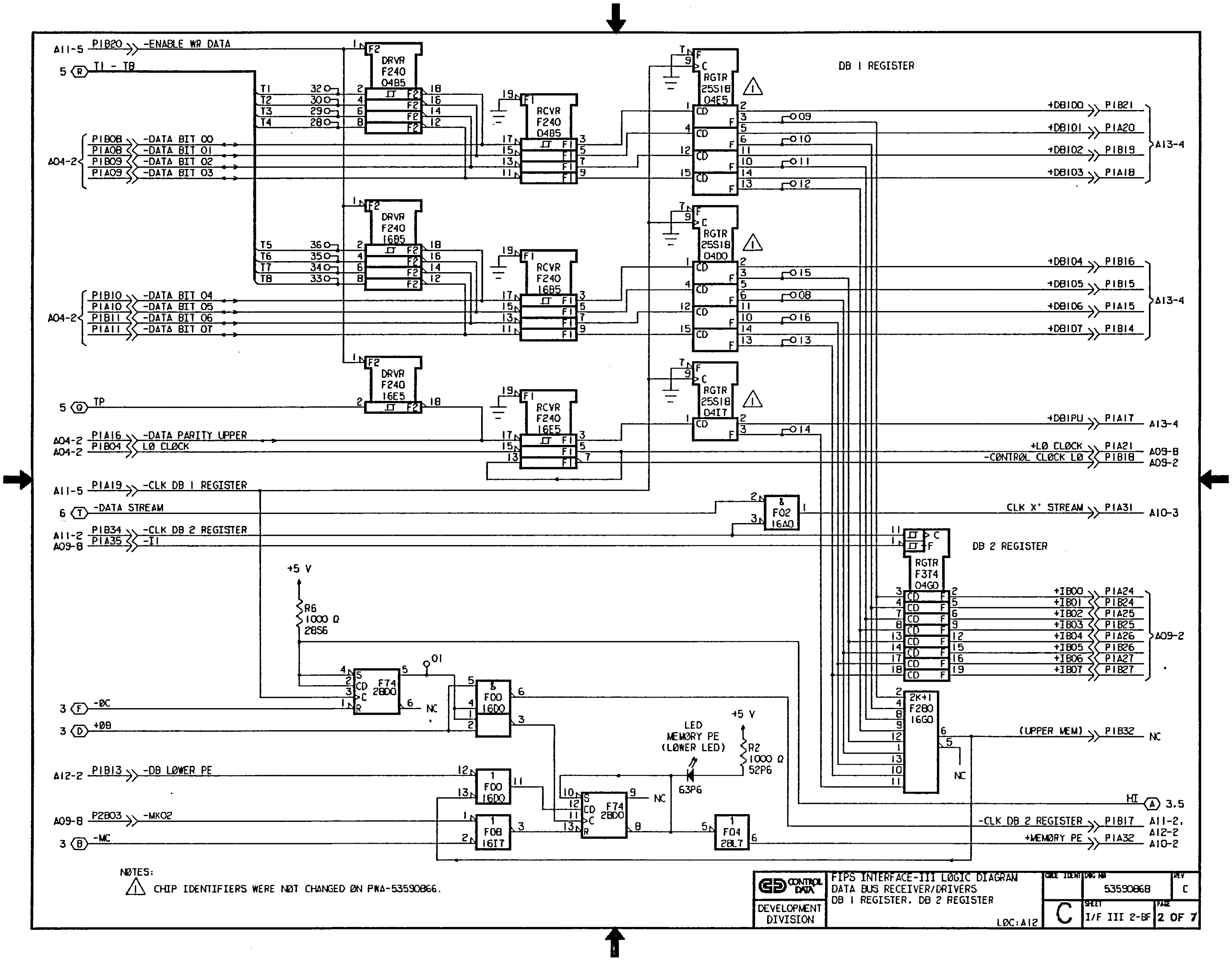
During a coupler write operation, the lower 8-bit byte (bits 08 through 15) is read from memory onto the data bus and sent to the receivers on the same bidirectional pins used by the data bus drivers. The receivers send the 8-bit byte to the DB1 register.

Data Bus Registers (DB1/DB2)

The lower data bus bytes from the data bus receivers are clocked into the DB1 register by the Clk DB1 Register signal from the memory control circuit (A11-5). This signal is also used to generate the Clk DB2 Register signal (A11-2) that clocks the lower data byte from the DB1 register into the DB2 register to the data bus parity check circuit and to the data byte compare circuit (A13-2). The lower data byte (bits IB08 through IB15) is sent from the DB2 register to the I bus.

Data Bus Parity Check Circuit

This circuit performs an odd parity check of the lower data bus byte and associated parity bit. The memory parity error LED lights if an error occurs in transmission of the lower data bus byte.



NOTES:

⚠ CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-53590866.

CONTROL DATA
DEVELOPMENT DIVISION

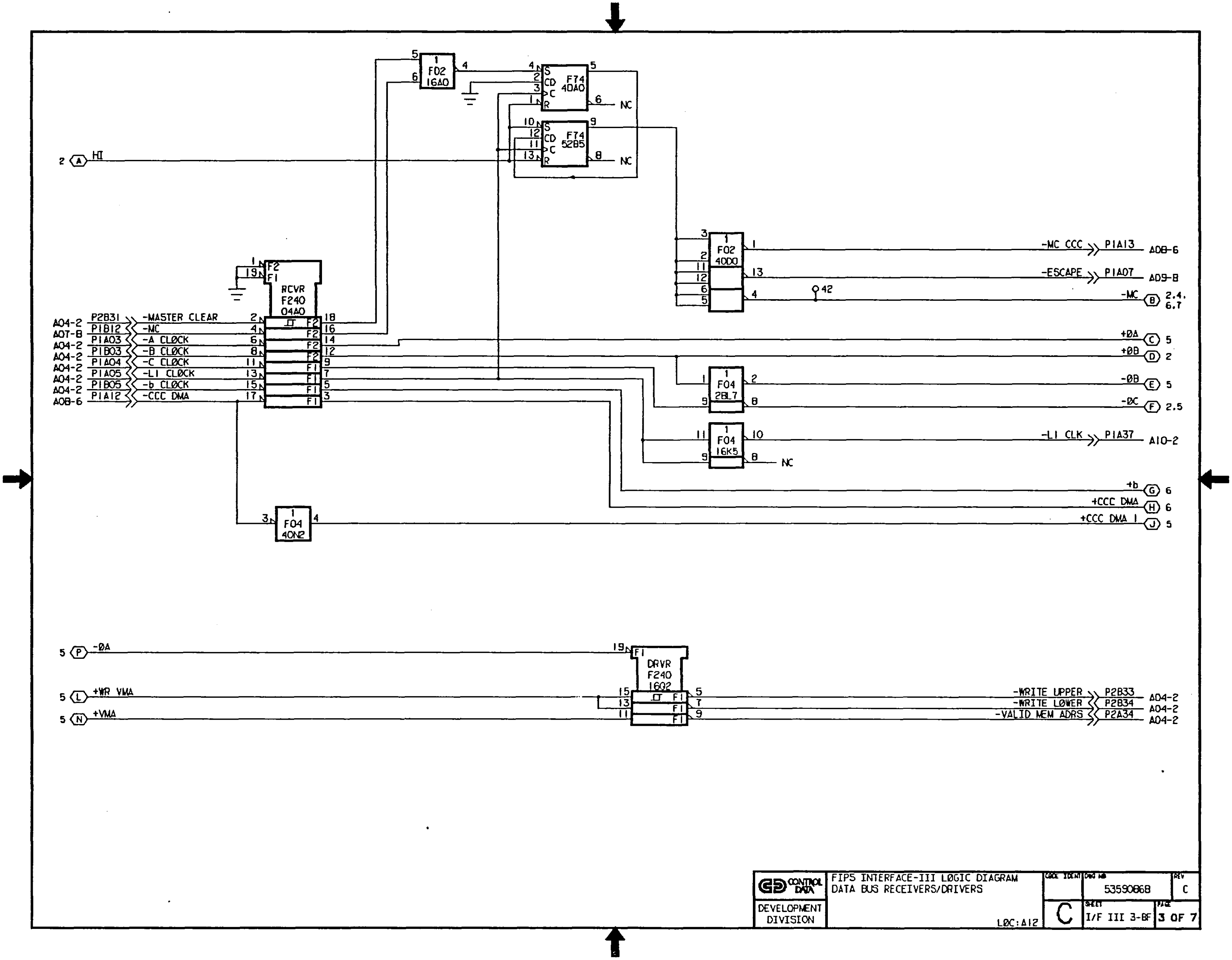
FIPS INTERFACE-III LOGIC DIAGRAM
DATA BUS RECEIVER/DRIVERS
DB 1 REGISTER. DB 2 REGISTER
LOC:A12

CODE IDENT	DWG NO	REV
	53590868	C
C	SHEET I/F III 2-BF	PAGE 2 OF 7

FIPS Interface - III (A12-3)

Data Bus Receivers/Drivers

Various clocks and signals including bus master clear are received from the data bus. The data bus drivers on this logic module are not used.



CONTROL DATA

DEVELOPMENT DIVISION

FIPS INTERFACE-III LOGIC DIAGRAM
DATA BUS RECEIVERS/DRIVERS

LOC:A12

CODE IDENT | DWG NO 53590868 | REV C

C | SHEET I/F III 3-8F | PAGE 3 OF 7

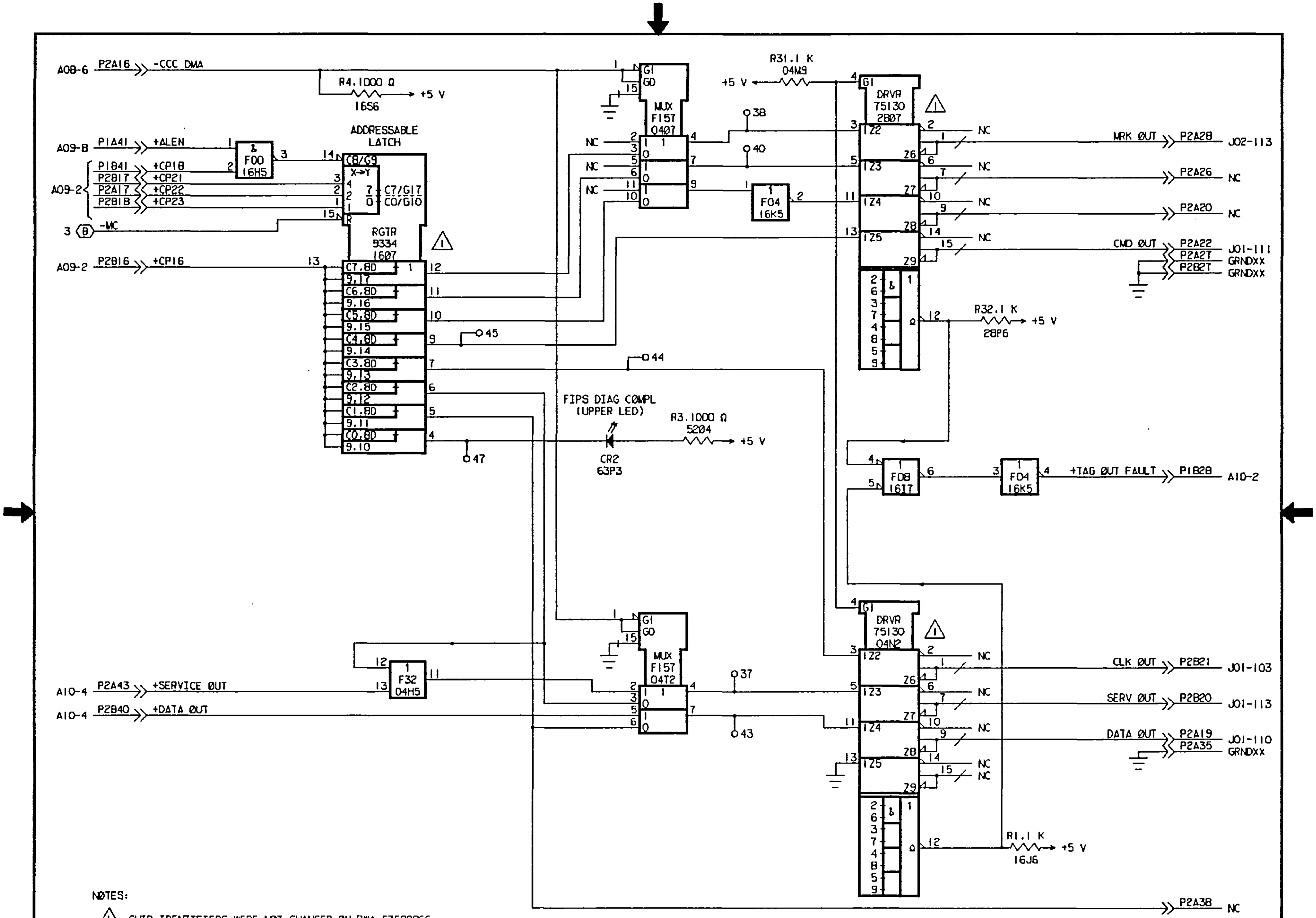
FIPS Interface - III (A12-4)

Addressable Latch Register

The outputs of this register are selected by microcode bits CP18, CP21, CP22, and CP23 from the FIPS interface UDI sequencer (A09-2). The register outputs are sent through the multiplexer circuits to the tag transmitters. The FIPS diagnostic complete LED indicator lights when the internal FIPS interface diagnostic starts running and goes out upon successful completion of the diagnostic test. The indicator remains lit if an error is detected.

Tag Transmitters

These circuits transmit signals on the tag lines to the external FIPS device. The tag lines control information that is present on the bus out lines (A13-5).



NOTES:

△ CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-53590866.

CONTROL DATA DEVELOPMENT DIVISION	FIPS INTERFACE-III LOGIC DIAGRAM TAG TRANSMITTERS LOC:A12	C	53590868 REV C I/F III 4-BF 4 OF 7

FIPS Interface - III (A12-5)

T Register

The lower 8-bit byte of assembly/disassembly information (bits AD08 through AD15) is clocked into the T register during a UDI read operation. The read data bits (T1 through T8) in the T register are then sent to the data bus drivers (A12-2) and to the parity generator.

T' Register

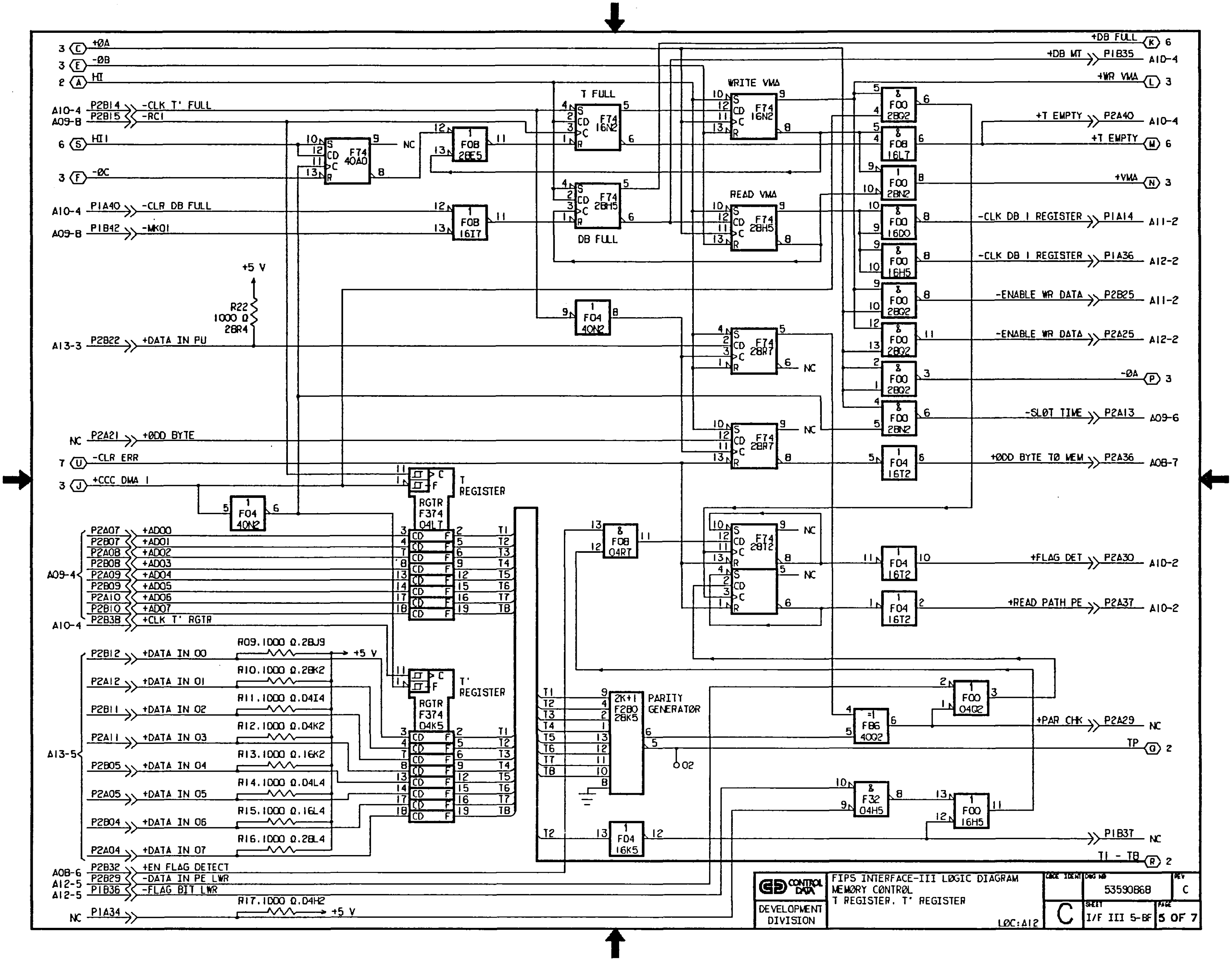
The lower 8-bit byte of data bus information (data-in bits 08 through 15) is clocked into the T' register during a DMA read operation. The read data bits (T1 through T8) are sent to the parity generator (A12-5) and to the data bus drivers (A12-2).

Parity Generation

A parity bit is generated on the data from the T or T' register. This parity bit (TP) is sent to the data bus driver (A11-2) along with the read data bits (T1 through T8). The parity generator also sends a parity bit to the parity check circuit (A11-5).

Flag Bit

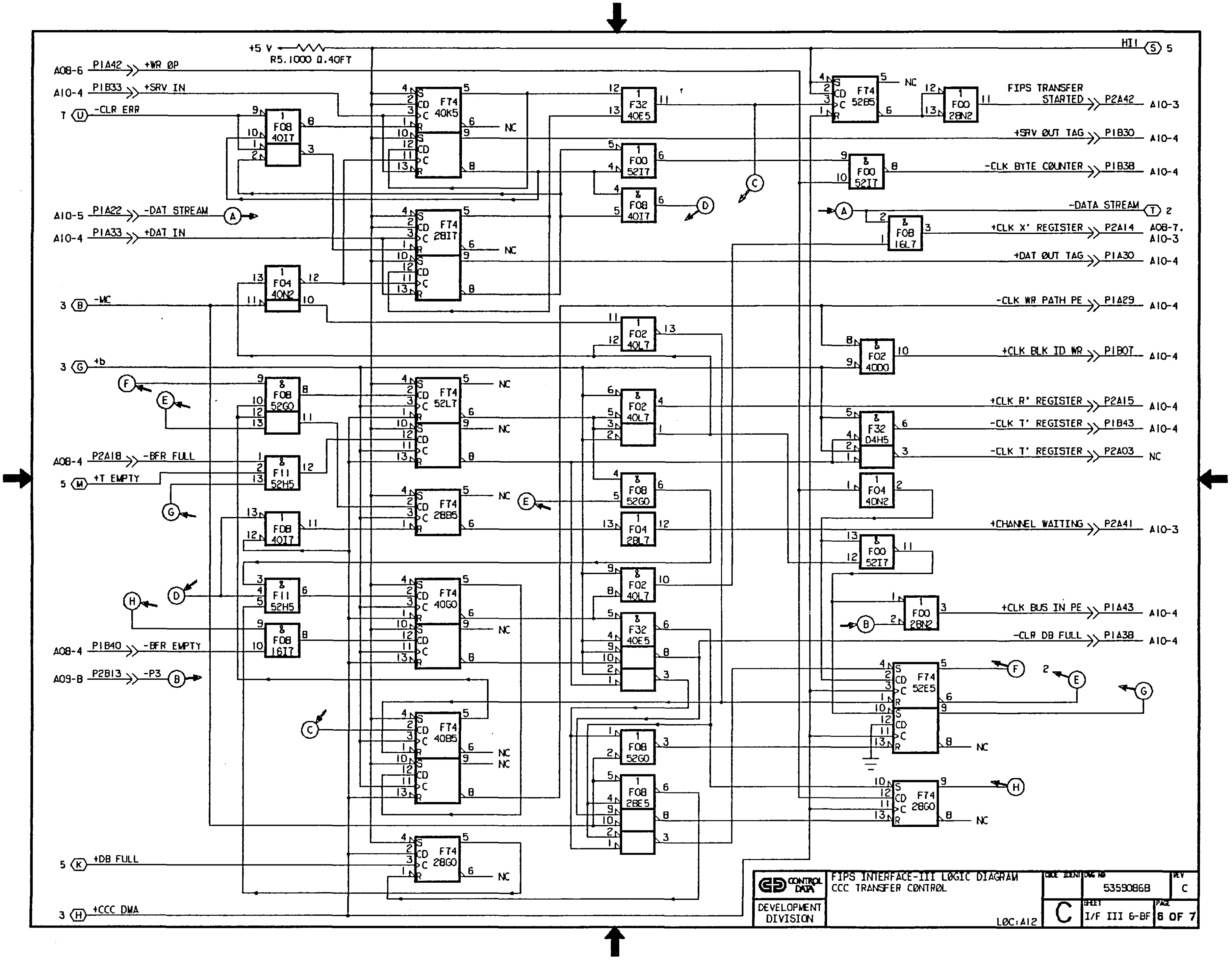
This bit is used to detect illegal 6-bit codes read from the code conversion read RAM (A13-3).


+0A
-0B
HI
-CLK T' FULL
-RCI
HII
-0C
-CLR DB FULL
-MK01
+5 V
R22 1000 Ω 28R4
+DATA IN PU
+0DD BYTE
-CLR ERR
+CCC DMA I
+AD00
+AD01
+AD02
+AD03
+AD04
+AD05
+AD06
+AD07
+CLK T' RGTR
+DATA IN 00
+DATA IN 01
+DATA IN 02
+DATA IN 03
+DATA IN 04
+DATA IN 05
+DATA IN 06
+DATA IN 07
+EN FLAG DETECT
-DATA IN PE LWR
-FLAG BIT LWR
R09, 1000 Ω, 28J9
R10, 1000 Ω, 28K2
R11, 1000 Ω, 04I4
R12, 1000 Ω, 04K2
R13, 1000 Ω, 16K2
R14, 1000 Ω, 04L4
R15, 1000 Ω, 16L4
R16, 1000 Ω, 28L4
R17, 1000 Ω, 04H2
T FULL
DB FULL
WRITE VMA
READ VMA
T REGISTER
T' REGISTER
RGTR F374 04LT
RGTR F374 04K5
PARITY GENERATOR
2K+1 F280 28K5
+DB FULL
+DB MT
+WR VMA
+T EMPTY
+T EMPTY
+VMA
-CLK DB I REGISTER
-CLK DB I REGISTER
-ENABLE WR DATA
-ENABLE WR DATA
-0A
-SL0T TIME
+0DD BYTE T0 MEM
+FLAG DET
+READ PATH PE
+PAR CHK
TP
T1 - T8
FIPS INTERFACE-III L0GIC DIAGRAM
MEM0RY C0NTR0L
T REGISTER, T' REGISTER
L0C:A12
CONTROL DATA
DEVELOPMENT DIVISION
53590868
C
I/F III 5-BF
5 OF 7

FIPS Interface - III (A12-6)

Transfer Control Circuits

The transfer control circuits are not used on this logic module. Transfer control is performed by logic module A11-6.



CONTROL DATA

DEVELOPMENT DIVISION

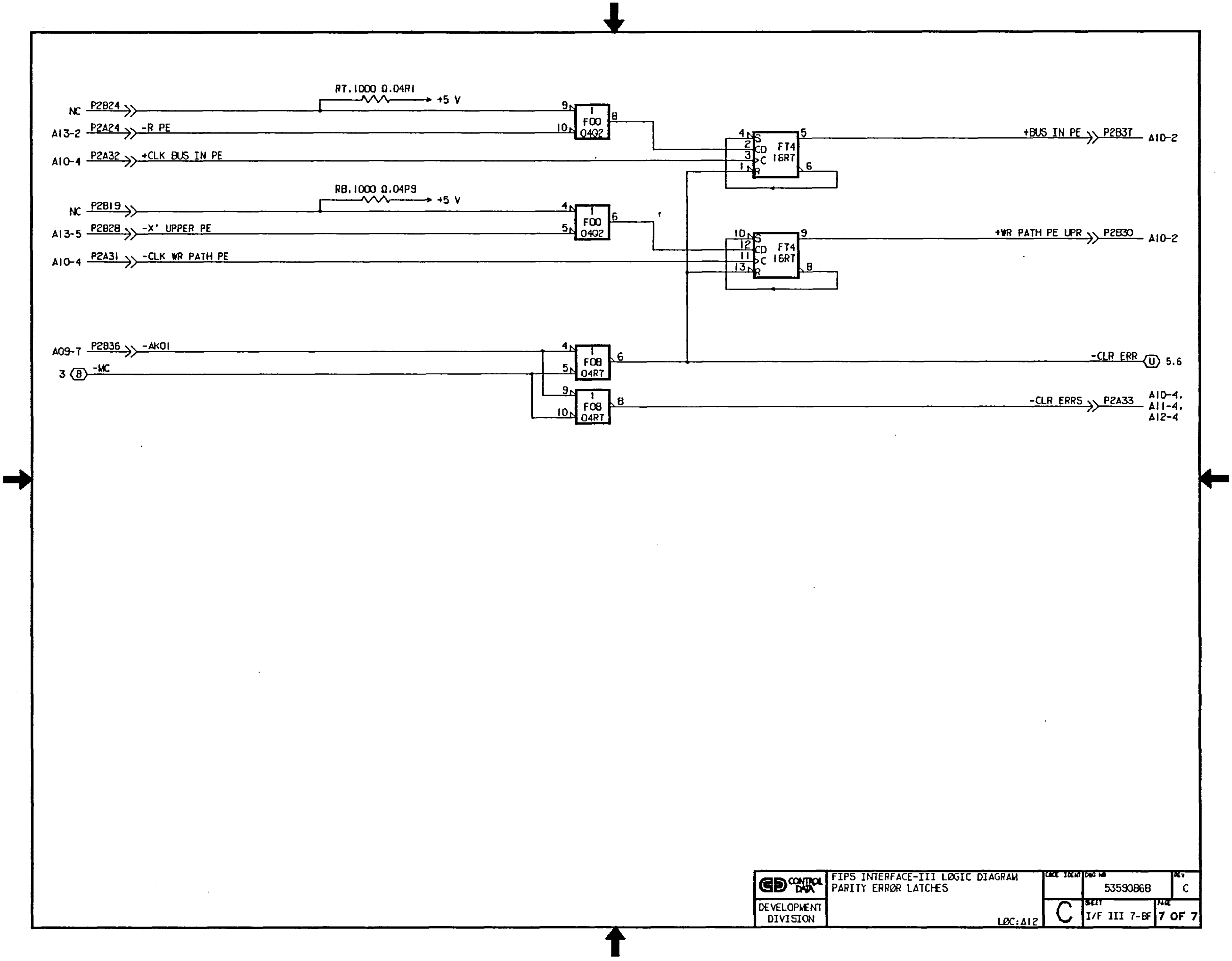
FIPS INTERFACE-III LØGIC DIAGRAM
CCC TRANSFER CØNTRØL

LØC:A12

DWG NO 53590868
REV C
C
SHEET I/F III 6-BF
PAGE 6 OF 7

FIPS Interface – III (A12-7)

The FIPS Interface – III Parity Error Latches diagram is shown on the facing page.


NC P2B24
A13-2 P2A24 -R PE
A10-4 P2A32 +CLK BUS IN PE
RT.1000 Ω.04R1
+5 V
9
10
1
F00
0402
8
NC P2B19
A13-5 P2B28 -X' UPPER PE
A10-4 P2A31 -CLK WR PATH PE
R8.1000 Ω.04P9
+5 V
4
5
1
F00
0402
6
4 S
2 CD
3 C
1 R
FT4
16RT
5
6
10 S
12 CD
11 C
13 R
FT4
16RT
9
8
+BUS IN PE P2B37 A10-2
+WR PATH PE UPR P2B30 A10-2
A09-7 P2B36 -AK01
3 B -MC
4
5
1
F08
04RT
6
9
10
1
F08
04RT
8
-CLR ERR U 5.6
-CLR ERRS P2A33 A10-4, A11-4, A12-4
CONTROL DATA
DEVELOPMENT DIVISION
FIPS INTERFACE-III LOGIC DIAGRAM
PARITY ERROR LATCHES
LOC:A12
53590868
C
C
I/F III 7-BF
7 OF 7

FIPS Interface – IV (A13)

The revision levels for the FIPS Interface - IV diagrams are shown on the facing page.

PAGE						REVISION RECORD					
6	5	4	3	2	1	ECO	DESCRIPTION	DRFT	DATE	CHKD	APVD
A	A	A	A	A	A		CLASS A RELEASED	EFA	11/85	NZ	RTH
B	B	B	B	B	B	CA47702	SEE NOTE 4	MES	8/18/86	NS	NS
C	C	C	C	C	C	CA48239	ADDED COVER, RE-INTERSHEET	MES	1/28/87	NS	NS
D	C	C	C	C	D	CA48539	SEE NOTE 5	MES	1/30/87	NS	NS
E	C	C	C	C	E	CA48580	CHANGED R29 LOC TO 28H2	MES	2/13/87	NS	NS
E	F	C	C	C	F	CA49088	SEE C.O.	KMS	8/13/87	NS	NS
E	G	C	C	C	G	CA49213	SEE C.O.	KMS	9/15/87	NS	NS

NOTES:

1. THIS DOCUMENT IS CONTAINED ON MAGNETIC TAPE. MAGNETIC TAPE IS STORED IN THE EDP GROUP OF ENGINEERING SERVICES SECTION,CDED DIVISION.
2. UPDATES TO LOGIC PRINTS MUST BE PERFORMED BY CALMA.
3. THE OFF SHEET SIGNAL REFERENCES DESIGNATE THE PAGE IN THE TITLE BLOCK AREA ON DIAGRAMS.
4. THE CHIP IDENTIFIERS ON PWA-53590844 WERE CHANGED TO 'F' TYPE CHIPS, UNLESS OTHERWISE NOTED. EXAMPLE 'S74' ON PWA-22194397 IS NOW 'F74' ON PWA-53590844.
5. THE 'F174' CHIP AT LOCATION 04K5 AND THE 'F175' CHIP AT LOCATION 16K5 WERE CHANGED BACK TO 'S174 AND S175' CHIPS. ADDED 330 OHM RESISTOR BETWEEN PINS P1A23 AND P1A30. SEE PAGE 6.

DETACHED LISTS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN
TOLERANCES
PLACE ± PLACE ± ANGLES ±
MATERIAL
FINISH

DWN	E F ARLANDSON	01/85
CHKD	N ZAK	01/85
ENGR	R T HENNING	12/85
MFG	B J REILAND	02/86
APVD	R T HENNING	12/85

EQUIP. NO. FR205-B

THIRD ANGLE PROJECTION

CONTROL DATA

ARDEN HILLS OPERATIONS
ST. PAUL, MINN.

TITLE

LOGIC DIAGRAM
FIPS I/F 4

PWA-10283690
PWB-53590845

SIZE	FSCM NO.	DWG NO.
C	34010	53590846

A13 SHEET I/F IV 1-F PAGE 1 OF 6

CALMA

CSIZECOVER1

FIPS Interface - IV (A13-2)

Bus In

Bus-in bits 0 through 7 carry read data or status information from the tape or disk device to the coupler. The bus-in receivers route the bus-in information to the R register, the parity check circuit, the code conversion read RAM (A13-3), and the block ID generator multiplexer (A13-6).

Parity Check Circuit

This circuit performs an odd parity check of the eight bus-in bits and associated parity bit. A bus-in parity error is sent to the control flag register (A11-7, A10-2) if an error occurs during transmission of bus-in data from the tape or disk device.

R Register

The bus-in bits are clocked into the R register by the -P3 clock from the FIPS interface UDI (A09-8). The bus-in bits are then sent from the R register to the data byte compare circuit and the I bus multiplexer.

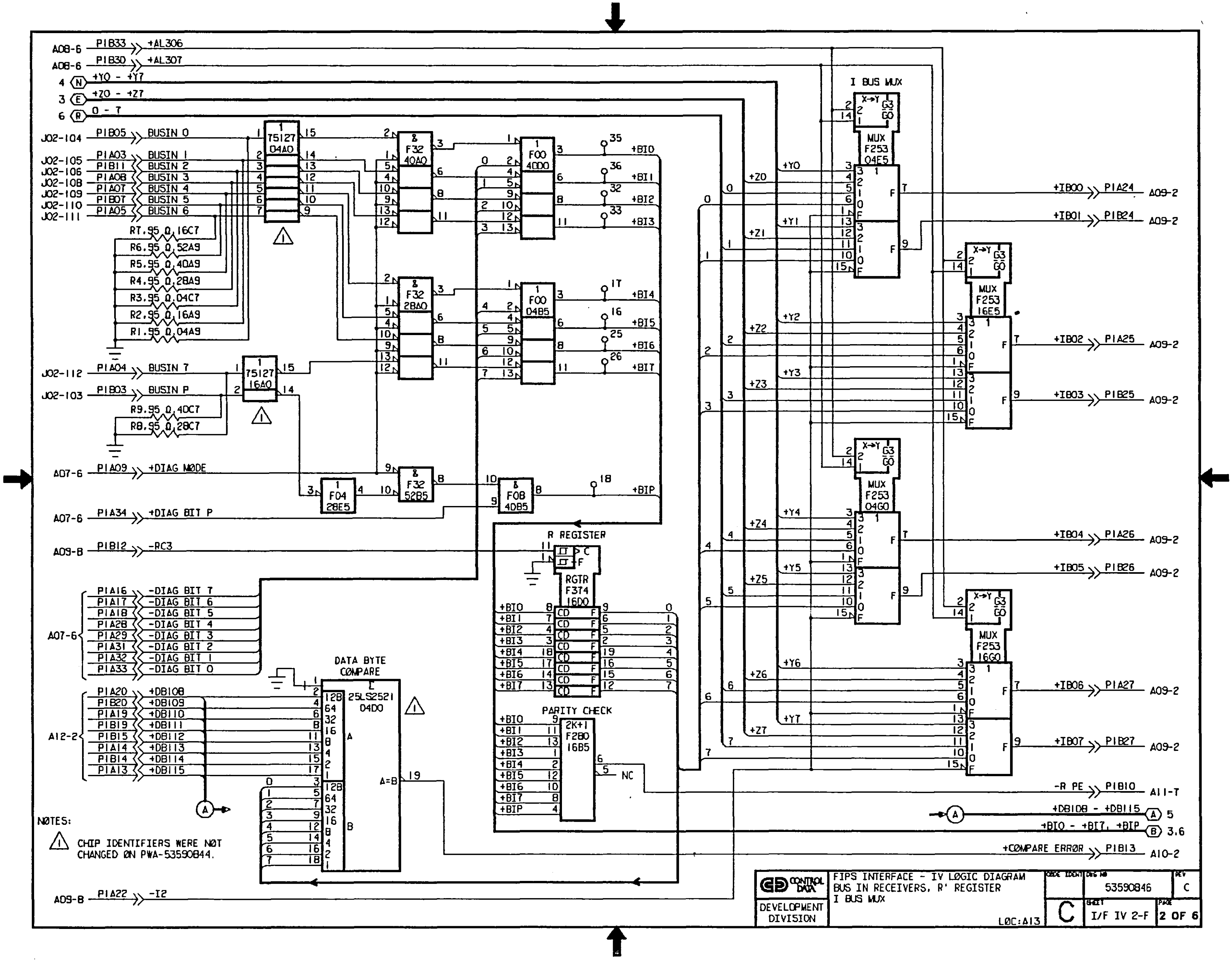
Data Byte Compare Circuit

The data byte compare circuit compares the expected bus-in byte (bits DB108 through DB115) with the last actual bus-in byte (bits BI0 through BI7) received by the R register. A compare error is sent to the control flag register (A10-2) if the bytes are not identical.

I Bus Mux

Addressable latch bits AL306 and AL307 form a code to enable the multiplexer to gate the following information to the I bus.

AL306	AL307	I-Bus Information
0	0	R register (bits BI0 through BI7)
0	1	Block ID (bits 0 through 7)
1	0	Read conversion memory (bits Z0 through Z7)
1	1	Write conversion memory (bits Y0 through Y7)



NOTES:

1. CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-53590844.

CONTROL DATA
DEVELOPMENT DIVISION

FIPS INTERFACE - IV LOGIC DIAGRAM
BUS IN RECEIVERS, R' REGISTER
I BUS MUX

LOC:A13

CODE IDENT	DWG NO	REV
	53590846	C
C	SHEET I/F IV 2-F	PAGE 2 OF 6

FIPS Interface - IV (A13-3)

Load Code

When the processor selects a load code read table operation, bits CT0 through CT7 from the address counter (A13-4) are gated through the multiplexer and sent to the code conversion read RAM. These bits provide the addresses for loading conversion codes (bits BO0 through BO7) into the RAM.

Copy Code

When the processor selects a read (copy) code read table operation, bits CT0 through CT7 from the address counter (A13-4) are gated through the multiplexer and sent to the code conversion read RAM. These bits provide the addresses for reading the conversion codes from the code conversion read RAM and transferring them to the R' register.

Code Conversion Read Operation

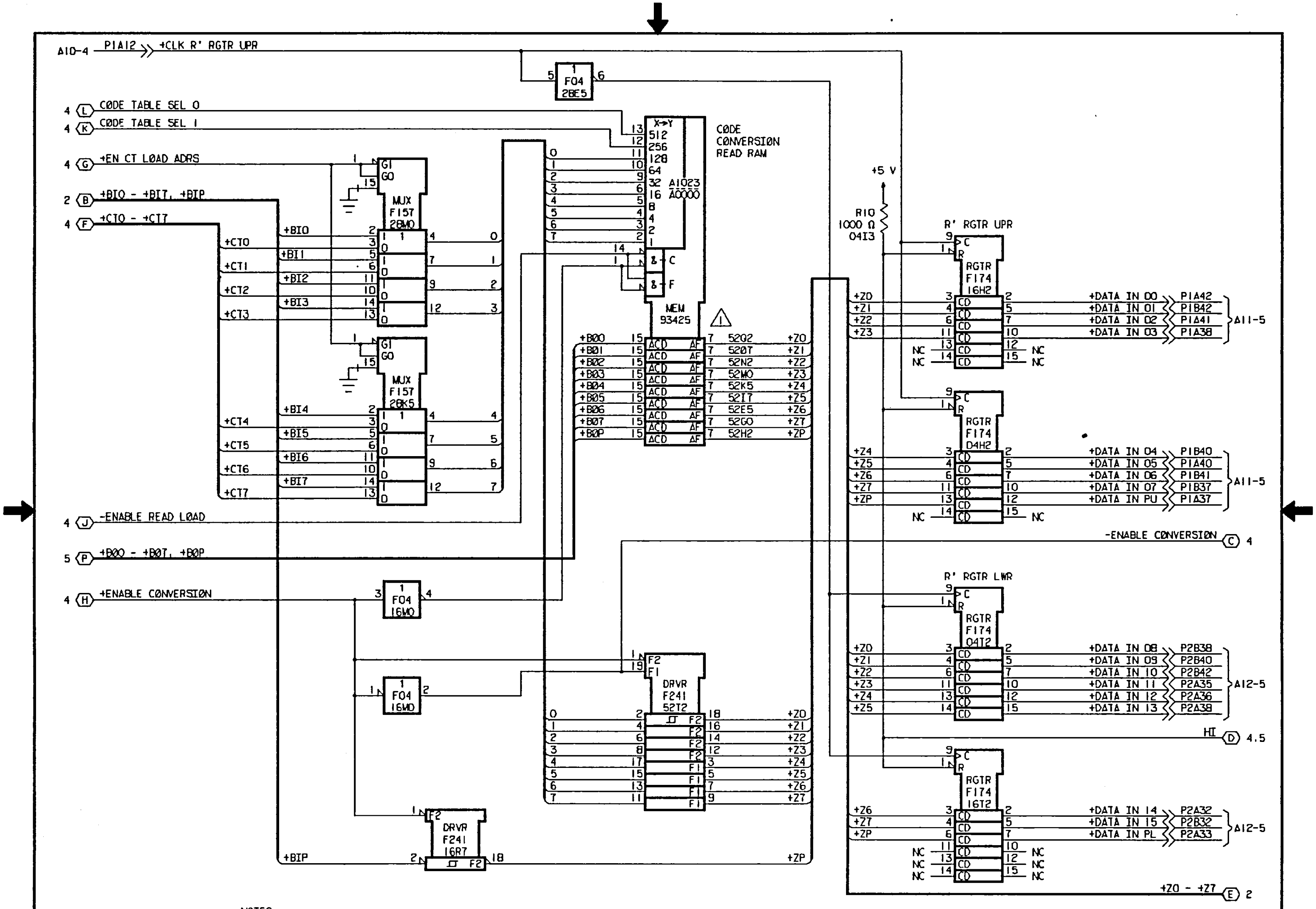
When data is read with code conversion, the data character (bits BI0 through BI7) from the tape device is used as an address to read its corresponding conversion code from the code conversion read RAM. This coded character is eventually sent to the CYBER channel in place of the tape device data character.

When data is read with code conversion disabled, bus-in bits BI0 through BI7 are gated through the driver and bypass the code conversion read RAM.

Code Table Select

The code table select signals form a code to select one of four tables in the code conversion read RAM as follows.

Code Table Sel 0	Code Table Sel 1	Table
0	0	1
0	1	2
1	0	3
1	1	4



NOTES:

⚠ CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-53590844.

CONTROL DATA DEVELOPMENT DIVISION	FIPS INTERFACE - IV LOGIC DIAGRAM READ CODE CONVERSION R' REGISTER LOC:A13	CODE IDENT C	DWG NO 53590846 SHEET I/F IV 3-F	REV C PAGE 3 OF 6

FIPS Interface - IV (A13-4)

Load Code

When the processor selects a load code write table operation, assembly/disassembly bits AD00 through AD07 are clocked through the address counter (bits CT0 through CT7), gated through the multiplexer, and sent to the code conversion write RAM. These bits provide the addresses for loading conversion codes (bits BO0 through BO7) into the RAM. The address counter increments by one each time a conversion code is entered.

Copy Code

When the processor selects a read (copy) code write table operation, assembly/disassembly bits AD00 through AD07 are clocked through the address counter (bits CT0 through CT7), gated through the multiplexer, and sent to the code conversion write RAM. These bits provide the address for reading the conversion codes from the RAM. The address counter increments by one each time a conversion code is read.

Code Conversion Write Operation

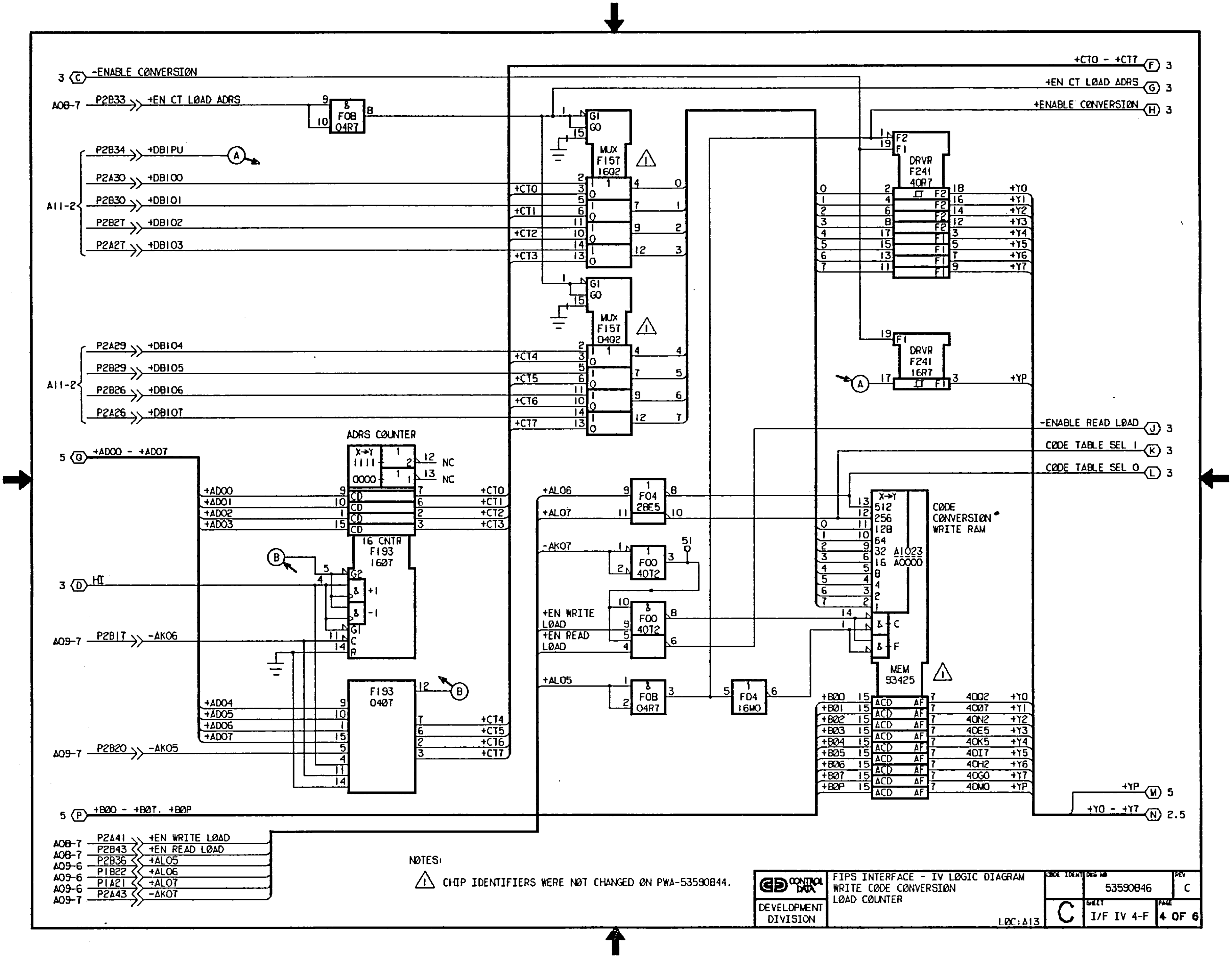
When data is written with code conversion, the data character (bits DB100 through DB107) from the CYBER channel is used as an address to read its corresponding conversion code from the code conversion write RAM. This coded character is eventually sent to the tape device in place of the CYBER channel data character.

When data is written with code conversion disabled, data bus bits DB100 through DB107 are gated through the driver and bypass the code conversion write RAM.

Code Table Select

The code table select signals form a code to select one of four tables in the code conversion write RAM as follows.

Code Table Sel 0	Code Table Sel 1	Table
0	0	1
0	1	2
1	0	3
1	1	4



NOTES:

⚠ CHIP IDENTIFIERS WERE NOT CHANGED ON PWA-53590844.

CONTROL DATA
DEVELOPMENT DIVISION

FIPS INTERFACE - IV LOGIC DIAGRAM
WRITE CODE CONVERSION
LOAD COUNTER

LOC: A13

DWG NO 53590846
REV C
SIZE C
SHEET I/F IV 4-F
PAGE 4 OF 6

FIPS Interface - IV (A13-5)

X' Register

Data bus information (bits Y0 through Y7) is clocked into the X' register during a direct memory access (DMA) write operation. The write data bits (BO0 through BO7) from the X' register are then sent to the FIPS device on the bus-out lines. The X' register bits are also sent to the parity generator (A13-5) and to the block ID generator (A13-6).

X Register

Assembly/disassembly information (bits AD00 through AD07) is clocked into the X register during a UDI write operation. The write data bits (BO0 through BO7) from the X register are then written into the code conversion read RAM (A13-3) or code conversion write RAM (A13-4) during a load conversion code operation or sent directly to the FIPS device on the bus-out lines during a normal write operation.

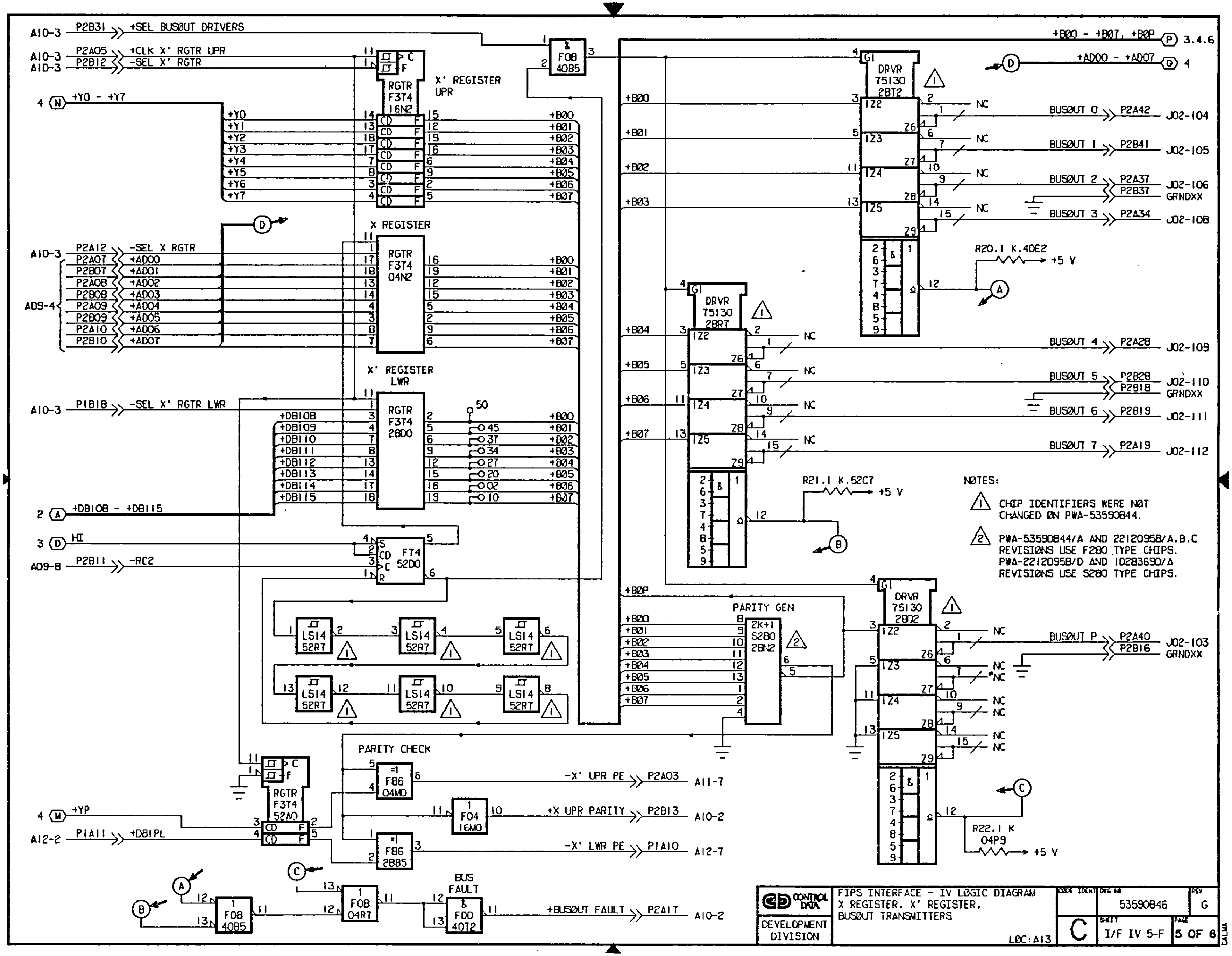
The X register bits are also sent to the parity generator (A13-5) and the block ID generator (A13-6).

Parity Generation

A parity bit is generated on data from either the X' register or the X register. The parity bit is sent to the external FIPS device on the bus-out P line, to the control flag register (A10-2), and to the parity check circuit (A13-5).

Parity Check Circuit

This circuit compares the DMA write data parity bit (YP) with the parity bit generated from the DMA write data after it passes through the X' register. A write path parity error is sent to the control flag register (A10-2) if an error occurs in transmission of DMA write data.



NØTES:

1. CHIP IDENTIFIERS WERE NØT CHANGED ØN PWA-53590844.

2. PWA-53590844/A AND 22120958/A,B,C REVISIØNS USE F280 TYPE CHIPS. PWA-22120958/D AND 10283690/A REVISIØNS USE S280 TYPE CHIPS.

DEVELOPMENT DIVISION

FIPS INTERFACE - IV LØGIC DIAGRAM
X REGISTER, X' REGISTER,
BUSØUT TRANSMITTERS

LØC: A13

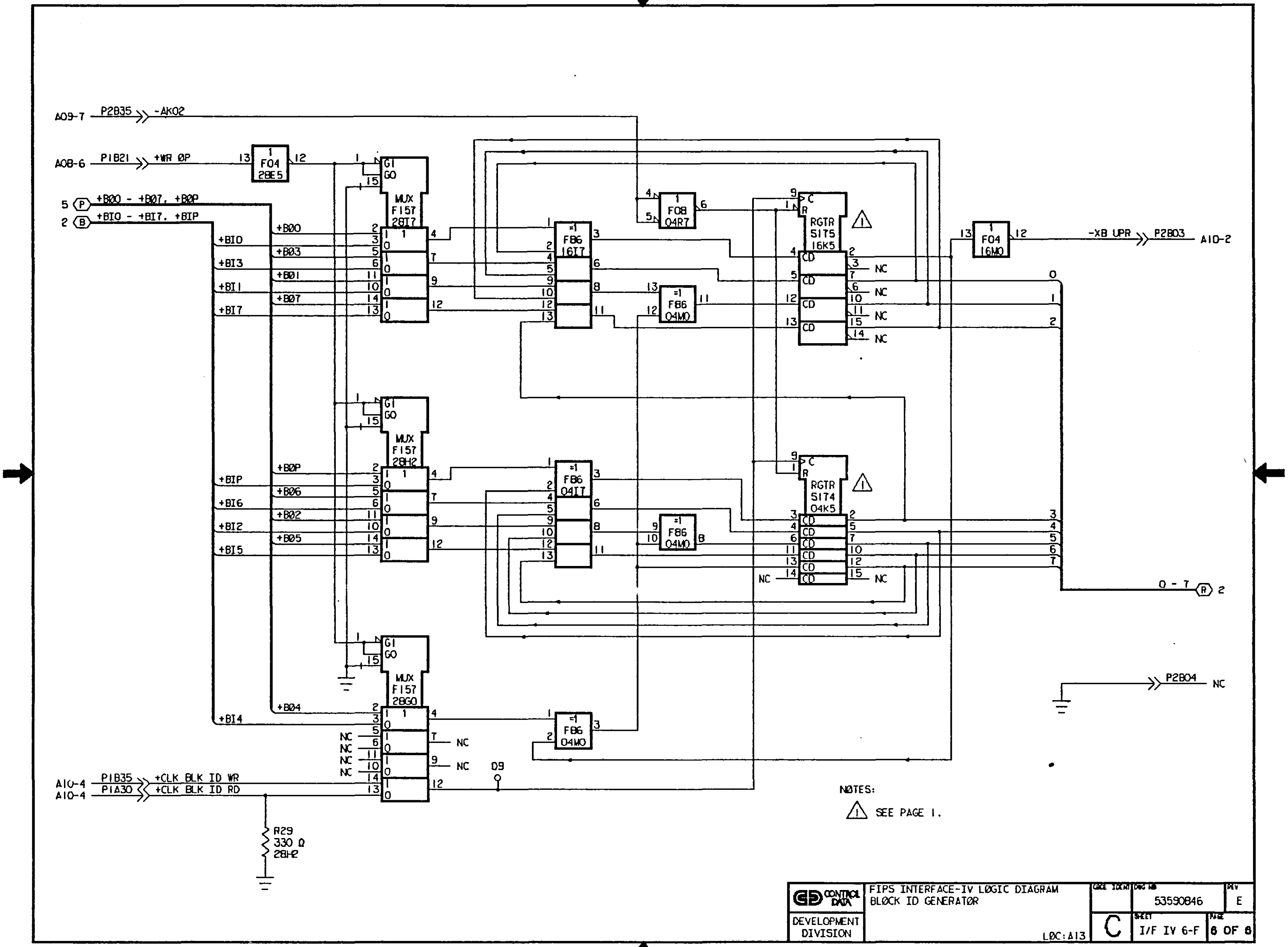
CODE IDENT	DWG NO	REV
C	53590846	G

SHEET	PAGE
I/F IV 5-F	5 OF 6

FIPS Interface - IV (A13-6)

Block ID Generator

This cyclic generator provides a 9-bit identification code for each block of bus-in data (BI0 through BI7, BIP) during a read operation and for each block of bus-out data (BO0 through BO7, BOP) during a write operation. The upper bit of the block ID (X8 Upr) is sent to the control flag register (A10-2) while the other eight bits are sent to the I bus multiplexer (A13-2). The block ID is read when the processor performs a read block ID operation.



NOTES:

⚠ SEE PAGE 1.

CONTROL DATA DEVELOPMENT DIVISION	FIPS INTERFACE-IV LOGIC DIAGRAM BLOCK ID GENERATOR LOC:A13	C	53590846 I/F IV 6-F	E 6 OF 6

Maintenance (A14)

The revision levels for the Maintenance diagrams are shown on the facing page.

PAGE					REVISION RECORD					
5	4	3	2	1	ECO	DISCRIPTION	DRFT	DATE	CHKD	APVD
A	A	A	A	A	—	CLASS A RELEASED	GRH	5/19/87	GRH	GRH
B	A	A	A	B	CA49260	MAINT BD -CLK LED REG	GRH	10/5/87	GRH	GRH

1. THIS DOCUMENT IS CONTAINED ON MAGNETIC TAPE. MAGNETIC TAPE IS STORED IN THE EDP GROUP OF ENGINEERING SERVICES SECTION, CDED DIVISION

2. UPDATES TO LOGIC PRINTS MUST BE PERFORMED BY PERIPHERAL ENGINEERING GROUP CDED

3. THE OFF SHEET SIGNAL REFERENCES DESIGNATE THE PAGE IN THE TITLE BLOCK AREA ON DIAGRAMS.

DRWN	G R HODD	5/19/87
CHKD	G R HODD	5/19/87
ENGR	G R HODD	5/19/87
APVD	L B ULFIG	5/19/87

EQUIP. NO.
FR205-B

TITLE

LOGIC DIAGRAM
MAINTENANCE BOARD

PWA 10285797 PWB 22118278

MENTOR • CCC/CCC.CR/MAINT_CR_COVER SHEET1

CONTROL DATA CORPORATION
ARDEN HILLS OPERATIONS

MAINTENANCE BOARD
LOC: A14

B	FSCM • 34010	DRAWING NO. 22114744
SHEET 1 OF 5	DATE 10/5/87	REV B

APOLLO

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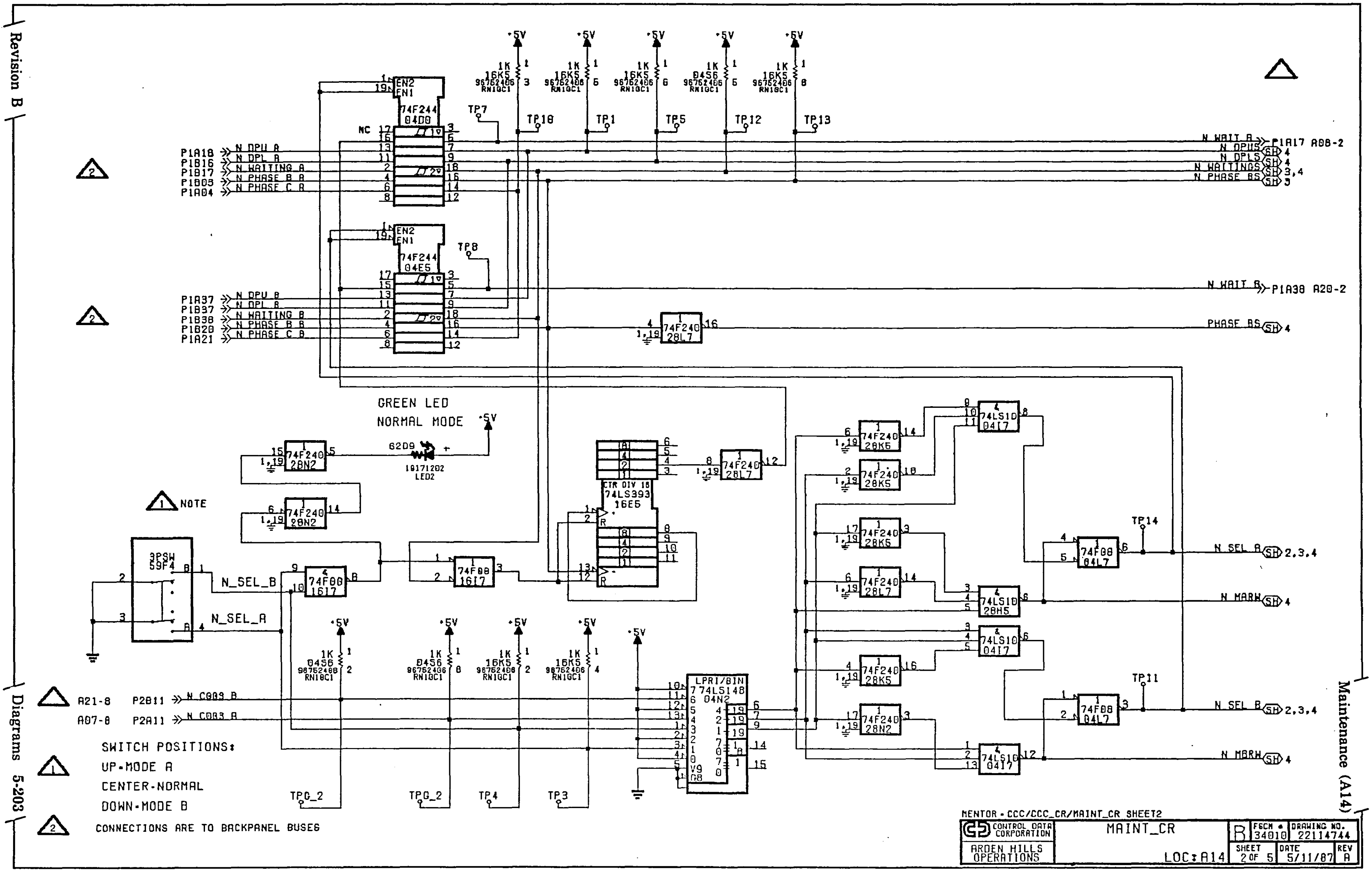

SWITCH POSITIONS:
UP-MODE A
CENTER-NORMAL
DOWN-MODE B

CONNECTIONS ARE TO BACKPANEL BUSES

MENTOR - CCC/CCC_CR/MAINT_CR SHEET2

CONTROL DATA CORPORATION	MAINT_CR	B	FSCM # 34010	DRAWING NO. 22114744
ARDEN HILLS OPERATIONS	LOC: A14		SHEET 2 OF 5	DATE 5/11/87 REV A

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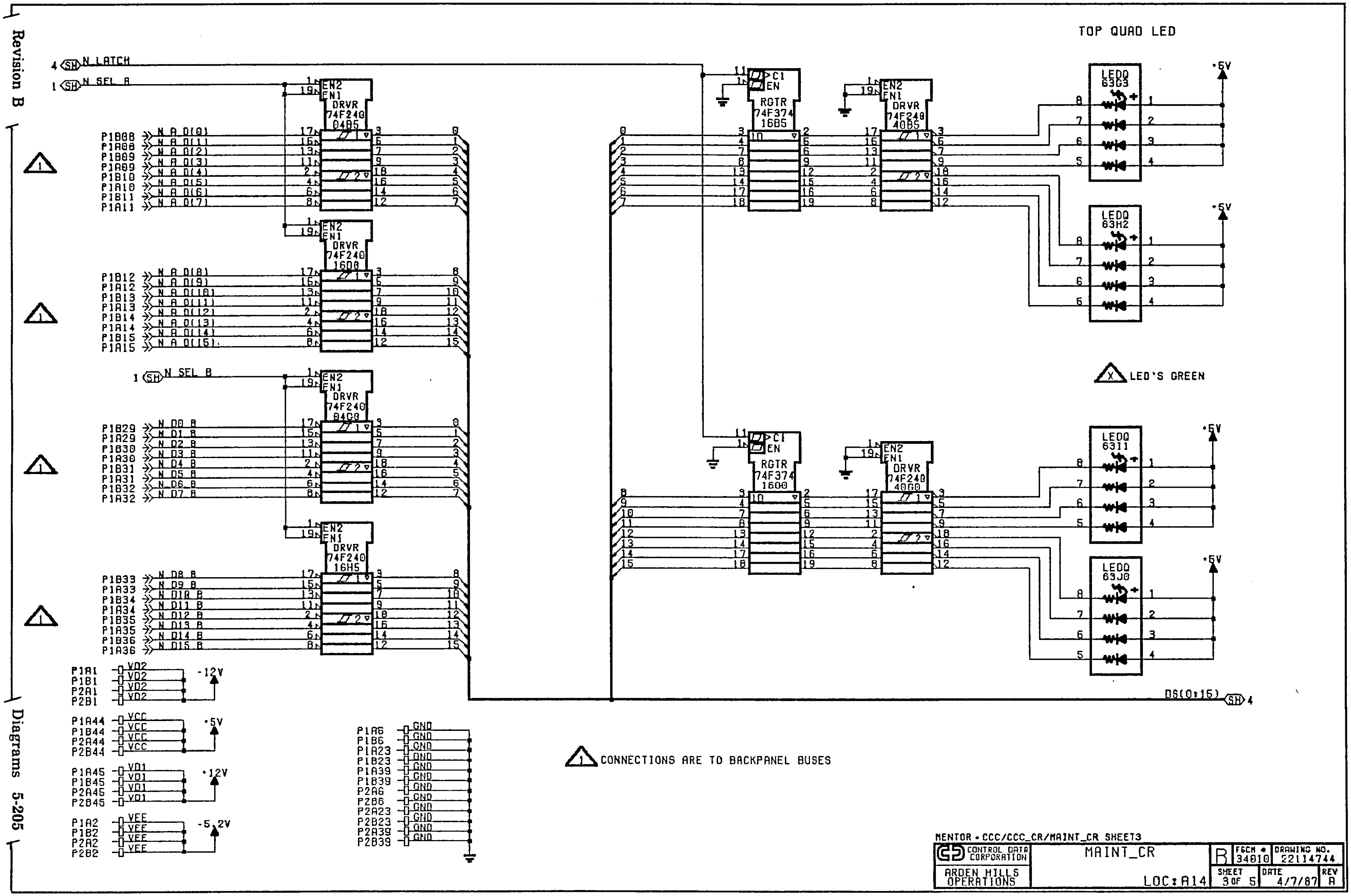

1 CONNECTIONS ARE TO BACKPANEL BUSES

MENTOR • CCC/CCC_CR/MAINT_CR SHEET3

CONTROL DATA CORPORATION
ARDEN HILLS OPERATIONS

MAINT_CR
LOC: A14

B
FSCM • 34010
DRAWING NO. 22114744
SHEET 3 OF 5
DATE 4/7/87
REV A

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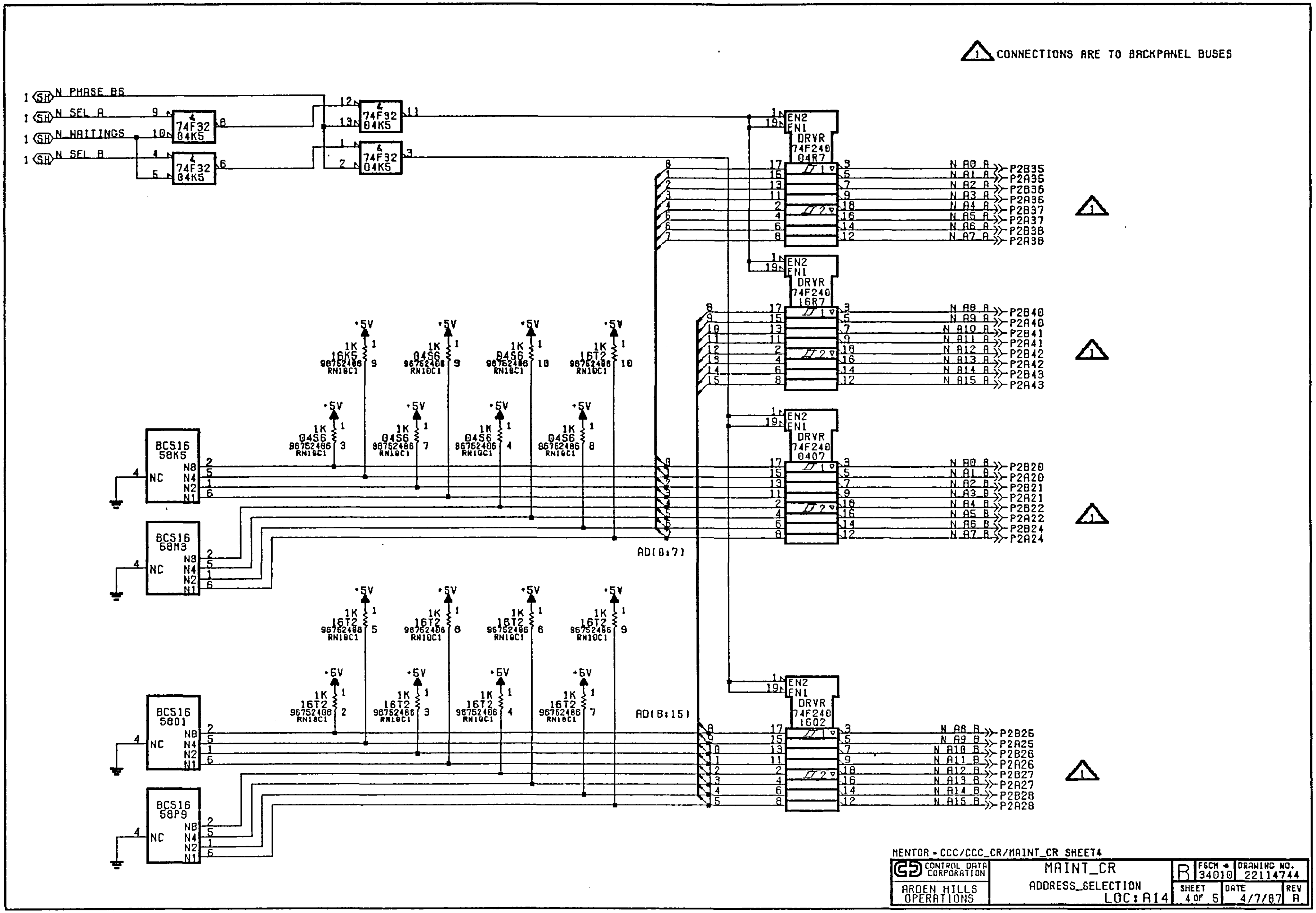

MENTOR - CCC/CCC_CR/MAINT_CR SHEET4

CONTROL DATA CORPORATION
ARDEN HILLS OPERATIONS

MAINT_CR
ADDRESS_SELECTION
LOC: A14

B
FSCM ● 34010
DRAWING NO. 22114744
SHEET 4 OF 5
DATE 4/7/87
REV A

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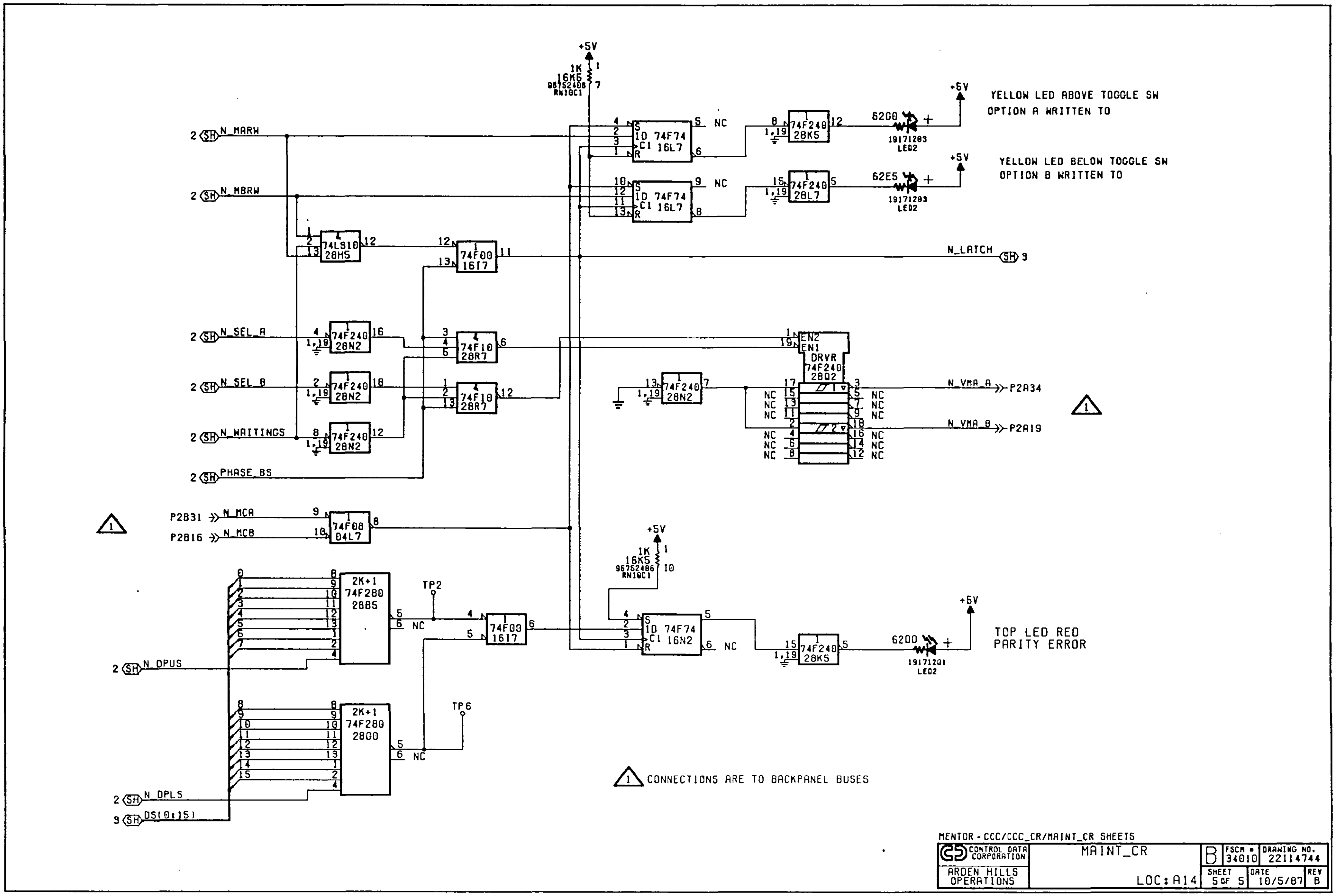
+5V
1K
16K6
96752486
RN16C1
YELLOW LED ABOVE TOGGLE SW
OPTION A WRITTEN TO
YELLOW LED BELOW TOGGLE SW
OPTION B WRITTEN TO
N_MARW
N_MBRW
74F74
16L7
74F240
28K5
28L7
62G0
62E5
19171283
LED2
74LS10
28H5
74F00
16I7
N_LATCH
N_SEL_A
N_SEL_B
N_WAITINGS
PHASE_BS
28N2
74F10
28R7
EN2
EN1
DRVR
74F240
28Q2
N_VMA_A
P2A34
N_VMA_B
P2A19
NC
P2B31
P2B16
N_MCA
N_MCB
74F08
04L7
2K+1
74F280
28B5
28G0
TP2
TP6
N_DPUS
N_DPLS
DS(0:15)
1K
16K5
74F74
16N2
TOP LED RED
PARITY ERROR
62D0
19171201
CONNECTIONS ARE TO BACKPANEL BUSES
MENTOR - CCC/CCC_CR/MAINT_CR SHEETS
CONTROL DATA CORPORATION
ARDEN HILLS OPERATIONS
MAINT_CR
LOC: A14
B
FSCM NO. 34010
DRAWING NO. 22114744
SHEET 5 OF 5
DATE 10/5/87
REV B

Power Distribution Diagram

400-Hz and 50/60-Hz Input Power

The 400-Hz input power feeds the +5 V and -5 V logic power supplies A5, A6A3, and A6A1, and the 50/60-Hz input power is used to run blower motor A4B1.

When the POWER DISCONNECT 400-HZ circuit breaker (A7CB1) is placed in the ON position, one line of the 400-Hz power is routed to pin 5 of connector A4J1. This power is applied through high-temperature sensor A4A1S1 to relay A7XK1, and the relay energizes. This enables the same line of the 400-Hz power to be routed through a closed contact of relay A7XK1 to energize relay A7K3. All three lines of the 400-Hz power are now applied through circuit breaker A7CB1, and through the closed contacts of relay A7K3 to the +5 V and -5 V power supplies. Circuit breaker A7CB1 also provides overload protection for the power supplies.

Placing the POWER DISCONNECT 50/60-HZ switch (A7S1) in the ON position applies 50/60-Hz power to blower motor A4B1.

High-Temperature Sensor (A4A1)

Normal Operation

Under normal temperature conditions, 400-Hz current flows through resistor R1 and high-temperature sensor S1 and energizes relay A7XK1. This, in turn, enables relay A7K3 to energize and apply 400-Hz power to the +5 V and -5 V logic power supplies. Resistor R1 heats the high-temperature sensor S1, but airflow from blower B1 maintains the temperature around the sensor below 55°C (130°F).

High-Temperature Operation

If the cabinet temperature rises to 55 °C (130 °F) because of blower failure or other reasons, current through resistor A4R1 causes the high-temperature sensor A4S1 to open. This removes 400-Hz power from relay A7XK1, and it deenergizes. This, in turn, enables relay A7K3 to deenergize and remove 400-Hz power from the logic power supplies to stop operation. Also when A7XK1 deenergizes, 400-Hz ground is applied through a closed contact of the relay to pin 4 of connector A4J1. This enables the 400-Hz power to light the AIRFLOW SENSOR RELAY INDICATOR (test lamp A4DS1).

Test Procedure

The high-temperature sensor may be checked for proper operation by pressing and holding the AIRFLOW SENSOR BLOWER OFF switch (test switch A4S1). This removes 50/60-Hz power from blower motor A4B1. Within approximately 1-1/2 minutes, the high-temperature sensor (A4A1S1) should open and cause the +5 V and -5 V logic power supplies to shut down and the AIRFLOW SENSOR RELAY INDICATOR to light. Release the AIRFLOW SENSOR BLOWER OFF switch. Place POWER DISCONNECT switch A7S1 in the OFF position for approximately 5 minutes and then back to the ON position to resume normal operation. If necessary, reset the POWER DISCONNECT 400-HZ circuit breaker A7CB1.

Meter Circuit (A5A1)

The +5 V and -5 V power supplies apply power to the meter circuit. METER SELECTOR switch S1 selects either +5 V or -5 V as the input voltage to the 0 percent meter M1. The meter is adjusted for a zero percent indication for both the +5 V and -5 V inputs with variable resistor R4. The 6-V and 12-V inputs and associated variable resistors R5 and R6 are not used.

Convenience Outlet (A7J10)

This 120-V, 50/60-Hz outlet is protected only by the 7-A circuit breaker A7CB2. For this reason, it should be used only with low power electrical equipment drawing less than 7 A.

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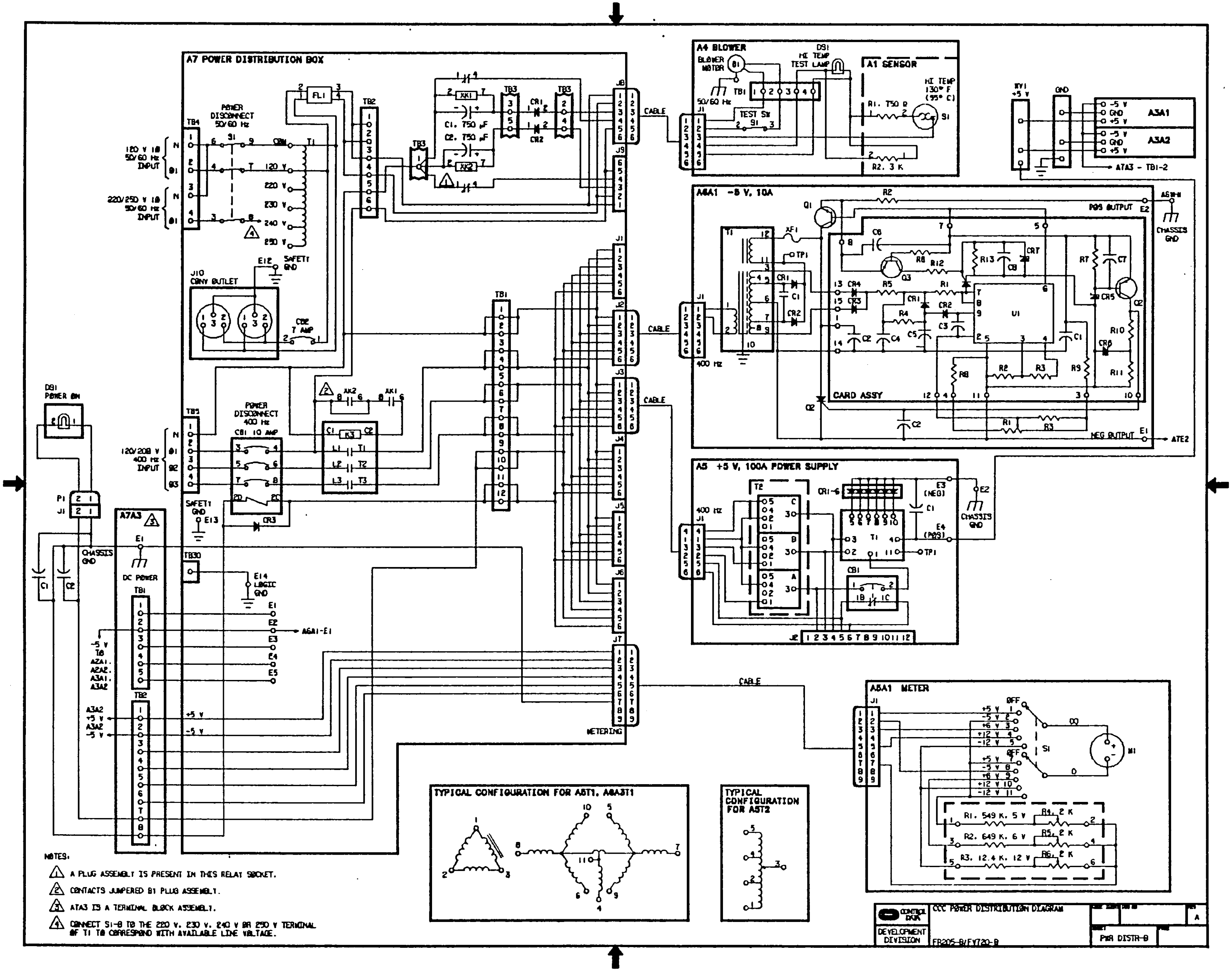


NOTES:

1. A PLUG ASSEMBLY IS PRESENT IN THIS RELAY SOCKET.
2. CONTACTS JUMPERED BY PLUG ASSEMBLY.
3. ATA3 IS A TERMINAL BLOCK ASSEMBLY.
4. CONNECT S1-8 TO THE 220 V. 230 V. 240 V OR 250 V TERMINAL OF T1 TO CORRESPOND WITH AVAILABLE LINE VOLTAGE.

CONTROL DATA

DEVELOPMENT DIVISION

CCC POWER DISTRIBUTION DIAGRAM

FB205-B/FY720-B

PWR DISTR-B

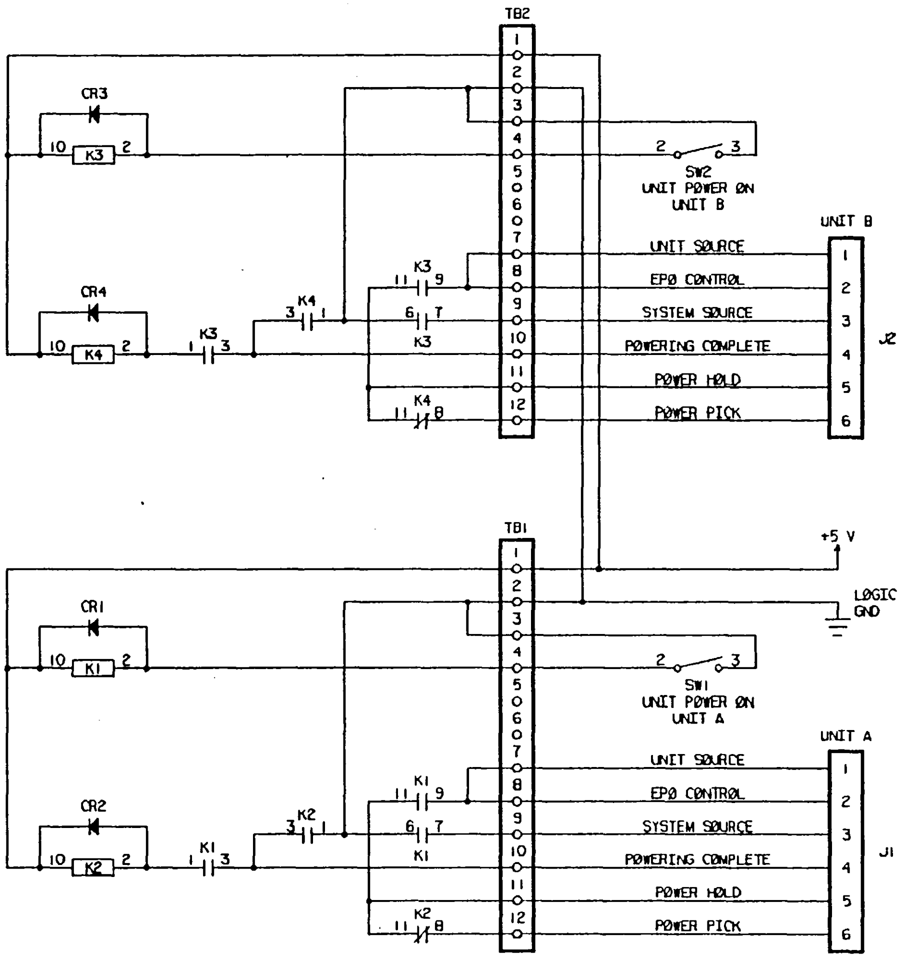
A

CCC Power Interface Diagram

When the UNIT A POWER-ON switch (SW1) is placed in the ON position, relay K1 energizes. This allows relay K1 contacts to close, which routes 24 volts dc from the CCC subsystem on the unit source line back to the CCC subsystem on the power hold line. The same closed contacts of relay K1 and normally closed contacts of relay K2 also route the 24 volts back to the CCC subsystem on the power pick line. Closed contacts of relay K1 also route coupler logic ground to the CCC subsystem on the system source line. The CCC subsystem then returns a ground signal on the powering complete line and relay K2 energizes. This allows the normally closed contacts of relay K2 to open and drop the power pick voltage to the CCC subsystem. In case the powering complete ground signal drops, relay K2 is held energized by a logic ground latch through closed contacts of relays K2 and K1. The emergency power off (EPO) control line from the CCC subsystem is not controlled by the coupler.

When the UNIT A POWER-ON switch (SW1) is placed in the OFF position, logic ground is removed from relay K1 and it deenergizes. Contacts of relay K1 open and drop 24 volts on the power hold line and logic ground on the system source line. Open contacts of relay K1 also deenergize relay K2 and the circuit completely shuts down.

The UNIT B POWER-ON circuit functions in the same manner as the UNIT A POWER-ON circuit.



NOTES:

1. SWITCHES SHOWN IN OFF POSITION.
   RELAYS SHOWN IN DEENERGIZED POSITION.

CONTROL DATA	CCC POWER INTERFACE DIAGRAM	CODE IDENT	DWG NO	REV C
DEVELOPMENT DIVISION	FR205-B	C	SHEET PWR INTFC	PAGE

Maintenance 6

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Maintenance 6

This section provides information to assist the customer engineer (CE) in troubleshooting and performing maintenance on the CYBER Channel Coupler (the coupler). The material presented assumes a basic familiarity with the coupler, the CDC CYBER 170/180 Computer System, HPA, MALET, and DEMOT. Knowledge of basic maintenance techniques, including use of common CE tools and test equipment, is also required. The maintenance information covers checks, adjustments, removal, and replacement of the field-replaceable units (FRUs) as directed by the associated structured analysis method (SAM) listings (see section 7) for the coupler. Information is organized under the following major headings.

- General Maintenance Information
- Preventive Maintenance Task Procedures
- Maintenance Aids
- Explanation of SAM Format
- Organization of SAMs and Procedures

General Maintenance Information

The following paragraphs provide general maintenance information that the CE should be familiar with before troubleshooting and performing maintenance on the coupler. These are:

- Safety Precautions
- MOS Circuit-Handling Precautions
- Maintenance Tools and Materials

Safety Precautions

Observe the following safety precautions at all times.

WARNING

Failure to observe safety precautions may cause equipment damage and/or personal injury.

- Hazardous voltages exist in the equipment cabinets. Do not attempt repair unless qualified to do so.
- Exercise caution any time checks or adjustments are being made with power applied to coupler.
- Always turn power off when removing/replacing components or cables.

MOS Circuit-Handling Precautions

The following special handling procedures are necessary for printed-circuit boards containing metal-oxide semiconductor (MOS) integrated circuits.

CAUTION

MOS ICs are susceptible to damage from static electricity. To prevent damage to MOS circuits, observe the following precautions when handling PC boards.

- Turn power off before removing/installing or otherwise connecting/disconnecting any circuits.
- Ensure that any item that comes in contact with the PC board is electrically grounded.
- Wear wrist ground straps to bleed off any accumulated static charge while handling or removing/installing PC board.
- Handle PC board only by a noncircuit portion of board. Connector pins and etched circuit paths must not be touched.
- Place PC board in a special conductive envelope whenever board is removed from chassis.

Maintenance Tools and Materials

The maintenance procedures for the coupler only require the use of common CE hand tools and test equipment. No special test equipment, tools, or materials are required.

Preventive Maintenance Task Procedures (PMTP)

Perform PMTP as instructed in the following CAMS listing.

PREVENTIVE MAINTENANCE TASK PROCEDURE FOR CAMS ID FR205

5000 CLEANING AND COOLING CHECKS

PERFORM THE AIRFLOW SENSOR TEST AS DEFINED IN THE CYBER CHANNEL COUPLER MAINTENANCE MANUAL 60459180. (SEE PROCEDURE 3 IN SECTION 6B OF MANUAL.)

ALSO PERFORM THE AIR FILTER CLEANING PROCEDURE DEFINED IN THE SAME MANUAL. (SEE PROCEDURE 4 IN SECTION 6B OF MANUAL.)

Maintenance Aids

Several maintenance aids are available to the CE to assist in isolating and identifying the cause of faults within the coupler. The primary maintenance aids for fault isolation are the internal diagnostics, the down-line diagnostics, and the SAM troubleshooting listings. The SAMs are structured to isolate failures to FRUs based on diagnostic error codes and other fault symptoms that may be present. The SAMs also provide a procedure number reference to the applicable remove/replace/adjustment procedure that is to be used to correct the malfunction. The SAMs and remove/replace/adjustment procedures are contained in sections 7 and 8, respectively.

Descriptions of the diagnostic tests and other maintenance aids available to the CE are described under the following headings.

- Coupler Internal Diagnostics
- Coupler Internal Diagnostic Error Codes
- Coupler Down-Line Diagnostics
- Peripheral Processor Diagnostic Functions
- CYBER Channel Interface Diagnostic Functions
- 0070-FIPS Device I/F Diagnostics Function
- CYBER Channel Parity Error Detection and Processing
- Deadman Timer Feature
- Coupler Memory Locations
- Coupler Maintenance Board
- HPA/MALET/DEMOT Execution

Coupler Internal Diagnostics

The three internal (PROM resident) self-test diagnostics provided to test the coupler are:

- CYBER channel interface diagnostic
- CYBER channel interface/processor interaction diagnostic
- FIPS device interface/processor interaction diagnostic

These diagnostics are executed sequentially following a power-on application, following a master clear, during a 0070 channel interface diagnostics function from the PP, during a 0414 autoload coupler microcode from PP function, or during a 06uu autoload coupler microcode from disk function. If all of the diagnostic tests run without error, the processor is placed into an idle loop at location 8400, waiting for a function code from the PP. The internal diagnostic tests are described in the following paragraphs.

CYBER Channel Interface Diagnostic

The CYBER channel interface diagnostic tests the internal logic circuits of the CYBER channel interface. This diagnostic consists of seven sections (sections 0 through 6). At the start of each section, an interrupt corresponding to that section is set (for example, interrupt 0 is set for section 0). The interrupt flip-flops are not used by the internal logic in the coupler; however, they provide sync points for maintenance troubleshooting use. The flip-flops remain set until a master clear is received.

Switch SW1-5 on module A05 of the CYBER channel interface logic allows the microcode to loop on the internal diagnostic when placed in the ON position. If an error or end-of-test is detected and the switch is ON, the microcode repeats the diagnostic starting with section 0. If an error is detected and the switch is in the OFF positon, the microcode loops on an address (hangs).

Upon successful completion of the internal diagnostic with switch SW1-5 in the OFF position, the microcode turns off the CYBER channel interface diagnostic LED (LED 5 on the A05 module) and jumps to the idle routine.

The following paragraphs briefly describe each of the diagnostic sections.

Section 0

Section 0 loads the address counter with all ones and the length counter with all zeros to check the length = 0 status. It then checks that decrementing the length does not increment the address and vice-versa. It also checks for simultaneously incrementing the address and decrementing the length.

Section 1

Section 1 loads the address counter with all zeros and the length counter with all ones. It then decrements the length counter to zero while incrementing the address counter and checks the address for nonzero. It also increments the address counter and checks for all zeros using length = 0 status.

Section 2

Section 2 starts with the address counter loaded with all zeros and does four pushes incrementing the address each time. It then moves the address value to the length counter and does four pops, decrementing the length counter each time. It checks for a length = 0 status after four pops.

Section 3

Section 3 checks all shift counts and tests each bit to ensure that a bit has not been inadvertently set. It then checks all shift counts and tests each bit to ensure that a bit has not been inadvertently cleared.

Section 4

Section 4 checks for constant assembly/disassembly clocks and also checks for missing assembly/disassembly clock pulses.

Section 5

Section 5 checks the bit setting and bit clearing capabilities using different shift counts to set and clear the same bit.

Section 6

Section 6 writes an address pattern in the register file and checks it using the address and length counters. It then loads the complement address pattern in the register file and checks it.

CYBER Channel Interface/Processor Interaction Diagnostic

This diagnostic tests the communication and interaction between the CYBER channel interface and the processor. The CYBER channel interface first loads the address counter with the contents of memory location 0021_{16} and reads 16 words into the register file. The CYBER channel interface then loads the address counter with the contents of memory location 0022_{16} and writes 16 words from the register file. If a memory parity error is detected while reading the op code or memory location 0021_{16} no data is read. The CYBER channel interface sets bit 12 (control package parity error) in memory location 0024_{16}, lights the memory parity error LED (LED 3 on module A04), and returns to the idle routine.

If a memory parity error is detected while reading data, the CYBER channel interface attempts to write the data back into memory and sets bit 10 (memory parity error) in memory location 0024_{16}. If a memory parity is detected while reading memory location 0022_{16}, no data is written and the CYBER channel interface sets bit 12 (control package parity error) in memory location 0024_{16} and lights the memory parity error LED (LED 3 on module A04).

If a memory parity error is detected while reading data or while reading memory location 0022_{16}, both a control package parity error status (bit 12) and a memory parity error status (bit 10) is returned to the processor. If no errors are detected, the CYBER channel interface writes the data to memory and sends a normal end status (bit 8) to the processor.

FIPS Device Interface/Processor Interaction Diagnostic

This diagnostic tests the communication and interaction between the FIPS device interface and the processor. An initialization control sequence consisting of a system reset followed by a halt is performed prior to each test segment. The initialization control sequence stores the starting address of the test segment to be executed in address 0028, and clears the ending status contained in location 002A. Execution of the test segment begins by performing a write instruction at location E000. At the completion of each test segment, the ending status stored in address 002A is checked for a nonzero condition. Normal completion is indicated by bit 0 being set, and an error is indicated by bit 0 being clear with the error status contained in bits 4 through 15.

The diagnostic uses block multiplexer mode to load the transfer registers with various data patterns and read back each data pattern for comparison. The patterns tested are all ones and alternating ones and zeros (using first 5555_{16}, then $AAAA_{16}$ patterns). Then the diagnostic performs a one-byte diagnostic write of all zeros, followed by a read block ID to verify that the data read back was correct. Next, a 256-byte buffer is written and verified by checking the block ID.

NOTE

Data is not transmitted to the external peripheral device. Only the internal data path within the coupler itself is tested.

Finally, a diagnostic read operation is performed that reads and verifies 256 bytes of alternating ones and zeros generated by the internal microcode in the FIPS device interface. The patterns generated are $FFFF_{16}$ and 0000_{16}.

The diagnostic then tests the stream mode logic by first performing a diagnostic read during stream mode. This test segment inputs 256 bytes of data, stores the data patterns in memory, and checks the block ID to see that it is 18C. The patterns stored in memory are:

1st word	0001
2nd word	0203
3rd word	0405
⋮	⋮
Last word	FEFF

A diagnostic write operation is then performed while in stream mode that generates the same patterns as above and the block ID is again checked for an 18C value. The receivers and transmitters are not actually checked during the stream mode test segments as no data is looped back; only the block IDs are checked.

Coupler Internal Diagnostic Error Codes

The coupler generates and returns to the PP various error codes detected by the internal diagnostics. The internal diagnostics are run during an autoload coupler microcode from PP function (0414), during an autoload coupler microcode from disk function (06uu), during a channel interface diagnostics function (0070), and during a power-on or pushbutton master clear. For most internal coupler diagnostic errors, the coupler returns a general status of 5XXX to the PP, where XXX is the octal error code. An error code in hexadecimal is also sent to the coupler maintenance panel for display. The error codes generated for the maintenance panel display and for general status are described in table 6-1.

NOTE

Error codes 1301_{16} through 1373_{16} are derived from the CYBER channel trace tables. See appendix A for additional information. Also, refer to the tabulation following this listing for definitions of error codes ending with X. For example, 805X indicates error codes 8051 through 805F inclusive.

Table 6-1. Error Codes for Maintenance Board and General Status

Maintenance Board (Hexadecimal)	General Status (Octal)	Error Description
1000		Processor is stopped.
1301 - 130A		CYBER channel I/F diagnostic error, section 0.
1311, 1312		CYBER channel I/F diagnostic error, section 1.
1321 - 1325		CYBER channel I/F diagnostic error, section 2.
1331 - 1338		CYBER channel I/F diagnostic error, section 3.
1341 - 1348		CYBER channel I/F diagnostic error, section 4.
1351, 1352		CYBER channel I/F diagnostic error, section 5.
1361		CYBER channel I/F diagnostic error, section 6.
1371		Control package memory parity error.
1372		Memory parity error.
1373		Length not 0 after memory read to RF and RF read to memory write.
8000		Start ROM resident diagnostics, command test failed.
8001		Memory test for CYBER and channel I/F failure.
8002		ROM checksum failure, locations 8000_{16} to $87FF_{16}$.
8003		ROM checksum failure, locations 8800_{16} to $8FFF_{16}$.
8004		CYBER I/F interaction test, function time-out.
8005		CYBER I/F interaction test, memory parity error.
8006		CYBER I/F interaction test, control package parity error.
8007		CYBER I/F interaction test, data miscompare.
8040	5100	Equipment switch settings (SW1-2, SW1-3, and SW1-4 on A04 module of the coupler) do not indicate a valid equipment type.

(Continued)

Table 6-1. Error Codes for Maintenance Board and General Status *(Continued)*

Maintenance Board (Hexadecimal)	General Status (Octal)	Error Description
805X*	5121 - 5137	Normal end did not set in the ending status word after a load transfer registers function.
806X*	5141 - 5157	Normal end did not set in the ending status word after a read transfer registers function.
8070	5160	Transfer registers data miscompare.
807X*	5161 - 5177	Normal end did not set in the ending status word after a diagnostic write sequence.
8080	5200	Full/Empty counter is incorrect after a diagnostic write sequence.
808X*	5201 - 5217	Normal end did not set after a read block ID function.
8090	5220	Block ID is incorrect after a diagnostic write sequence.
809X	5221 - 5237	Normal end did not set in the ending status word after a diagnostic read function.
80A0	5240	FIPS address is incorrect after a diagnostic write function.
80A8	5250	Diagnostic read pattern is incorrect.

* Hardware error codes ending in X indicate the following.

1	Write path parity error upper (1F09, bit 10 set)
2	Write path parity error lower (1F09, bit 2 set)
3	Memory parity error
4	Bus in parity error and read path parity error
5	Read path parity error
6	Bus out fault (1F08, bit 3 set)
7	Tag out fault upper (1F08, bit 4 set)
8	Tag out fault lower (1F08, bit 9 set)
9	Flag bit detected
A	Minimum block length not met
B	Select in received
C	No request in on poll sequence
D	Device address miscompare
E	Time-out on FIPS transfer
F	Not used

(Continued)

Table 6-1. Error Codes for Maintenance Board and General Status *(Continued)*

Maintenance Board (Hexadecimal)	General Status (Octal)	Error Description
80A9	5251	Transfer register error after a diagnostic read function.
80AA	5252	Block ID is wrong after a diagnostic read function.
80AB	5253	FIPS interface sequence did not complete.
80AC	5254	Data stream diagnostic read time-out.
80AD	5255	Data stream diagnostic write time-out.
80BX*	5261 - 5277	Data stream diagnostic read status is not normal end.
80C0	5300	Data stream diagnostic read block ID is wrong.
80CX*	5311 - 5327	Data stream diagnostic write status is not normal end.
80D8	5330	Data stream diagnostic write block ID is wrong.
8101	5401	System reset error occurred after checksum during autoload from PP function.
8102	5402	CYBER interface status error occurred after an autoload from PP function.
8103	5403	RAM checksum error occurred after autoload.

* Hardware error codes ending in X indicate the following.

1	Write path parity error upper (1F09, bit 10 set)
2	Write path parity error lower (1F09, bit 2 set)
3	Memory parity error
4	Bus in parity error and read path parity error
5	Read path parity error
6	Bus out fault (1F08, bit 3 set)
7	Tag out fault upper (1F08, bit 4 set)
8	Tag out fault lower (1F08, bit 9 set)
9	Flag bit detected
A	Minimum block length not met
B	Select in received
C	No request in on poll sequence
D	Device address miscompare
E	Time-out on FIPS transfer
F	Not used

(Continued)

Table 6-1. Error Codes for Maintenance Board and General Status *(Continued)*

Maintenance Board (Hexadecimal)	General Status (Octal)	Error Description
8140	5404	RAM memory test error occurred before the autoload from PP function started.
8141	5501	Seek or recalibrate sequence time-out from disk device.
8141	5101	Equipment switches set wrong.
8142	5502	Recalibrate or seek error from disk device.
8143	5503	Seek sequence ending status error from disk device.
8144	5504	Search error from disk device.
8145	5505	Read data error from disk device.
8147	5507	System reset sequence error from disk device.
8148	5110	Normal end not set in ending status after select sequence.
8148	5510	Search/read sequence time-out from disk device.
8149	5111	Normal end not set in ending status after load transfer registers.
814A	5112	Normal end not set in ending status after read transfer registers.
814B	5113	Transfer register data miscompare.
814C	5114	Normal end not set after diagnostic write sequence.
814F	5117	Full/empty count incorrect after diagnostic write.
8150	5120	SCU address incorrect after diagnostic write.
8151	5121	Normal end not set after read block ID.
8152	5122	Block ID wrong after diagnostic write.
8154	5124	Normal end not set after diagnostic read.
8156	5126	Diagnostic read data pattern incorrect.

(Continued)

Table 6-1. Error Codes for Maintenance Board and General Status *(Continued)*

Maintenance Board (Hexadecimal)	General Status (Octal)	Error Description
8157	5127	Transfer register error after diagnostic read.
8158	5130	Block ID wrong after diagnostic read.
816D	5155	SCU I/F sequence did not complete.
8200	5600	System reset sequence error.
8201	5601	Initial select/rewind sequence error.
8202	5602	Cannot locate controlware record error.
8203	5603	Input controlware record error.
8204	5604	RAM controlware checksum error.
8205	5605	Final select/rewind sequence error.
8800	0000	Normal completion of internal diagnostics. (ROM idle loop.)
8810	0000	Autoload from PP started.
8820	0000	Autoload from disk device started.
8840	0000	Autoload completed (ROM resident).
8888	0000	Autoload completed.

Coupler Down-Line Diagnostics

The following diagnostics (CLM, CCM, NDM, and NDP) are down-line loaded from the PP to the coupler. These diagnostics provide more extensive testing of the coupler than can be performed by the internal (self-test) diagnostics.

CLM - Diagnostic Loader/Monitor

CLM is the loader and monitor program for the down-line diagnostics. It is used to load, start, and monitor execution of these tests. The following restrictions apply.

- The test to be executed must be contained on the system file called "scratch" before a run command is given to CLM.
- Any test parameters must be entered before CLM is started or the test will execute using default parameters.

After CLM starts execution of a diagnostic test, the monitor checks the CCC memory locations containing the test status. All changes in the test status are checked by the monitor and made available to the user via the KL display, terminal display, or the print file. All errors detected during test execution due to I/O problems or hardware problems cause the test and the monitor to stop, and the error is reported. Two types of errors are possible: errors detected by CLM such as channel problems, no test on the system scratch file, or parameter problems; and errors detected by the test itself. Depending on the type of error, the user may or may not be able to continue test execution.

The various error messages reported by CLM are as follows.

- CLM00 - Parameter error detected.
- Processor Error on Master Clear - A compare error was detected when coupler memory locations 4 through F were read. This indicates that an error occurred during the master clear process. The user can continue test execution at own risk. The contents of addresses 4 through F are displayed during this error.
- TTTMM Stopped on Error - This message indicates that a test error has occurred and that the test has stopped. TTTMM is the name of the test/module that stopped.

- Error MMMMMMMMMMMMMMMMMMMM - This indicates that the test has stopped due to an error detected by the test. MMMMM...M is the test error message. Error message format is as follows.

```
EC=EEEE          ECNT=CCCC       ICNT=IIII

ADDR=AAAA        EXP=EXXX        ACT=RRRR

Hardware Status=HHHH
```

EEEE	Error code.	
	E0002	Channel Parity Error. The channel detected a parity error while data was being transferred across the CYBER channel.
	E0003	Test Loaded Incorrectly. The one-word verify process failed. This indicates that the complete test does not reside in CCC memory.
	E0004	Test Not in System File. Before the test is downloaded to the coupler, the loader checks to see if the coupler test was written into the system "scratch" file by looking for the 77 header table. This error message is reported if the 77 header table cannot be found.
	E0005	In-line Diagnostic Error. Prior to downloading a test to the coupler, the in-line diagnostics are executed. If the diagnostics complete properly, but the general status received is not equal to zero, then this error is reported.
CCCC	Error count.	
IIII	Iteration count.	
AAAA	Coupler address where failure occurred.	
EXXX	Expected contents of failing address.	
RRRR	Actual contents of failing address.	
HHHH	Coupler hardware status.	

- Clear RM to Terminate Test - This message alerts the user that the repeat module switch must be turned off before the test is terminated. If the RM switch is left on, the loader/monitor module keeps repeating.

- CCC In-Line Failure - No Response Within 500 ms - The in-line diagnostics were invoked by sending a zero length autoload command to the coupler and no response to the function was received within 500 ms. This indicates that the coupler is in a hung condition.

CCM - CCC Memory Test

CCM is a memory test for the coupler. The test resides in a peripheral processor and tests the memory of the coupler. The test does not use the processor in the coupler. During execution, the processor is stopped. The execution time for this test is approximately 50 s.

NOTE

This test destroys the coupler microcode in the coupler being tested.

This test consists of the following test modules.

Module	Description
CCM00	Tests the parameter words entered and verifies that they are valid for the coupler being tested.
CCM01	Verifies the DMA read and write data paths to memory by passing data to and from coupler memory through use of microcode functions.
CCM02	Tests the coupler memory using data patterns of all ones and all zeros.
CCM03	Tests the coupler memory using data patterns of 5555_{16} and $AAAA_{16}$
CCM04	Tests the coupler memory using an 8-bit sliding-zero data pattern. (Using FDFD, FBFB, F7F7, EFEF, DFDF, BFBF, and $7F7F_{16}$ data patterns.)
CCM05	Tests the coupler memory using an 8-bit sliding-one data pattern. (Using 0101, 0202, 0404, 0808, 1010, 2020, 4040, and 8080_{16} data patterns.)
CCM06	Tests the addressing capabilities of the coupler memory.
CCM07	Tests the coupler memory using random data patterns.

The following display formats are used by CCM to report errors to the user.

- Parameter Entry Errors:

```
CCM - CCC Memory Test
CCMNN - (M...........T)
CCMNN Suspected Parameter Error
(E................D)
P0 - P4  PPPP PPPP PPPP PPPP PPPP
P5 - P9  PPPP PPPP PPPP PPPP PPPP
```

NN	Module number
M.....T	Module title
E.....D	Description of the error
PPPP	Contents of the parameter word (P0 and P2 through P9 are not used. P1 = 0000 = Default value for 16K memory size. P1 = 0001 = 16K)

- Product Overlay Errors:

```
CCM - CCC Memory Test
CCMNN - (M...........T)

CCMNN Aborted on (C...........M)
    Last function = FFFFB  WT = WWWB
CCMNN  EXXXXB  LYYYB  (E............M)
```

NN	Module number
M.....T	Module title
C.....M	Command on which the abort occurred
FFFF	Last function issued to the coupler
WWWW	Words transferred during last data transfer
XXXX	The error code in octal
YYY	The EA register when the error occurred
E.....M	Verbal description of the error code

- Memory Data Errors:

```
CCM - CCC Memory Test
CCMNN - (M...........T)
CCMNN Aborted on (C...........M)
CCMNN  EXXXXB  LYYYB  (E...........M)
ADRS    EXP.    ACT.    DIF. (hexadecimal values)
AAAA    BBBB    CCCC    DDDD
AAAA    BBBB    CCCC    DDDD
AAAA    BBBB    CCCC    DDDD
AAAA    BBBB    CCCC    DDDD
AAAA    BBBB    CCCC    DDDD
AAAA    BBBB    CCCC    DDDD
AAAA    BBBB    CCCC    DDDD
AAAA    BBBB    CCCC    DDDD
```

NN	Module number
M...........T	Module title
C...........M	Command on which the abort occurred
XXXX	The error code in octal
YYY	The EA register when the error occurred
E...........M	Verbal description of the error code
AAAA	The failing address in the coupler memory
BBBB	The expected contents of the memory location
CCCC	The actual contents of the memory location
DDDD	The logical difference of BBBB and CCCC

NDM - CCC Memory Test

NDM is a memory data test for the coupler. It is designed to detect failing bits and failing addresses in the coupler memory. The diagnostic is loaded into the coupler memory and checks memory through use of the processor access. The NDM diagnostic for the coupler consists of seven test modules that get progressively more complex. These are described as follows.

NOTE

This test destroys the down-line loaded coupler microcode in the coupler being tested.

A memory parity error causes the processor in the coupler to stop. The processor status is stored in memory locations 4 through F_{16} in the processor memory.

Module	Descripton
Module 0	Quick look test. Tests the low memory locations. Addresses are read only; no write operations take place.
Module 1	Write and read data test. Checks for data and parity errors. The following data patterns are written throughout memory, then read. All 0's, all 1's, all 5's, and all A's.
Module 2	Data equal address test. Loads addresses to be tested with data that equals the address value. These addresses are then read and checked for a miscompare.
Module 3	Sliding one and zero test. Takes the starting address and sets bit 0. The data is then complemented for that address, and tested again. A right shift of one is performed and that address is tested again. This process continues until all bits in the address have been tested. This sequence is repeated for each address tested.
Module 4	Marching data test. Loads all memory to be tested with zeros. Then each address is read and $FFFF_{16}$ is written in that address. After all addresses have had this operation performed, the $FFFF_{16}$ data pattern is read and zeros are then written. Any data miscompares are reported.
Module 5	Relocatable test. Takes the portion of the NDM test that starts at address 200_{16} (excludes the low-memory addresses) and relocates it to upper memory starting at address 3000_{16}. Then a marching data test is run on addresses 200_{16} through $2FFF_{16}$. When testing is complete, NDM is relocated back to its original address locations.
Module 6	Random data test. Condition 1 generates a random data pattern for each address. When all of memory is written, each address is then read and a compare is performed to see that the random number read from each address is the same as the number generated for it. Condition 2 generates a random address, and then a random number is written in that address. This address is then read and verified.

The following error codes and messages are reported.

Error Code	Error Message
01	Data miscompare error. The data pattern written does not equal the data read.
02	Data-not-equal-to-address error. The data read from a location did not equal the address of that location.
03	SCDT miscompare error. A sliding bit in an address being written and then complemented had a miscompare.
04	MDT miscompare error. A machine data test where complemented data (zeros and ones) was written and then read from an address location and a data miscompare occurred.
05	Random data error. The random data written in an address did not compare with the data read from that address.
06	Random addressing data error. The random data written at a random address had a miscompare when read back.
07	Memory size error. The memory size set in parameter P1 is not valid. Accepted parameters are: 0 or 1 = 16K, 2 = 24K, 3 = 32K, 4 = 40K, 5 = 48K, 6 = 56K, 7 = 64K.

NDP - CCC Processor Test

NDP is a processor instruction test for the processor contained in the coupler. It is designed to detect failing instructions in the processor of the coupler. NDP contains a quick-look test and 63 test modules. The quick-look test is a confidence test of the coupler processor instructions. It is executed before any of the 63 test modules. The module test sequence is structured to test the simplest instructions first, and then gradually test the more complex instructions. A fixed set of operands is used to test some parts of the coupler processor such as the ALU and shift network. The code conversion instruction uses a canned set of random operands to test this instruction.

If NDP detects an error during execution of the quick-look diagnostic or if the processor detects a memory parity error, the processor is stopped and the status conditions are stored in locations 4 through F_{16} of the processor memory. The monitor program (CLM) detects the quick-look error condition and displays the contents of locations 4 through F_{16}.

Refer to the CLM loader/monitor diagnostic description for the format used for error messages.

Peripheral Processor Diagnostic Functions

The following seven PP diagnostic functions are decoded by the CYBER channel interface independent of processor instructions, and are not part of the microcode or firmware. The operation (Op) codes, in octal, are described as follows.

- X5XX - Load Address and Length
- X701 - Read
- X702 - Write
- X704 - Status
- X710 - Stop
- X720 - Go
- X740 - Master Clear

X5XX - Load Address and Length

This function allows the PP to activate the channel and send one or two data words. The lower 4 bits (XX) of the function are loaded into the upper 4 bits of the 16-bit address register. The first word sent is loaded into the lower 12 bits of the address register to complete its loading. The second word sent is loaded into the lower 12 bits of the 16-bit length register while the upper 4 bits are zero-filled. The channel interface responds only to the first two words sent and a hung channel may result if the PP attempts to send additional words. This function also clears register file 1 (status).

X701 - Read

This function allows the PP to activate the channel and input the length count times two words. The upper 8 bits of the 16-bit word referenced by the address register are transferred as the lower 8 bits of the first 12-bit channel word while the upper 4 bits are zero-filled. The lower 8 bits of the 16-bit word are transferred in the same manner as the upper 8 bits. The address is incremented, the length decremented, and the PP input process continues until the CYBER channel interface deactivates the channel when the length equals zero. The PP may terminate the operation early if desired. The address and length must be loaded prior to sending this function in order for data to be valid. A check for memory parity errors is made at the end of the data transfer and the results are logged in register file 1 (status).

X702 - Write

This function allows the PP to output the desired number of words. Only the address register is loaded by diagnostic function X5XX while the length register is not used. The lower 8 bits of the first 12-bit word received by the coupler are loaded into the upper 8 bits of a holding register. The lower 8 bits of the second 12-bit word are loaded into the lower 8 bits of the holding register. The contents of the holding register are then sent to memory. This process continues for additional words sent by the PP. The word transfer is terminated by an inactive signal from the channel. The address register must be loaded prior to every X702 function received by the coupler to ensure that data is written into the correct memory location. If an odd number of words are received, the lower 8 bits of the last word sent to memory are zero-filled.

X704 - Status

This function allows the PP to activate the channel and input one word of status from register file 1. The CYBER channel interface deactivates the channel after it sends the status word. This word contains the following status bits.

NOTE

Bit 11 is the most significant bit.

Bit	Description
Bit 11	Normal end
Bit 10	Channel parity error
Bit 9	Memory parity error
Bit 8	Deadman timeout
Bit 7	Control package parity error
Bit 6	Transfer indicator
Bit 5	Character fill
Bit 4	Not used
Bit 3	Length equals zero
Bit 2	DMA complete
Bit 1	Processor running
Bit 0	Processor abnormal

Bits 5 through 11 reflect the last status sent to memory location 0024_{16} following a processor operation. Diagnostic function X5XX clears bits 5 through 11. Only bits 8 through 10 of these bits are valid for diagnostic purposes as the others are processor-controlled bits. Bits 0 through 3 are dynamic status bits which indicate the state of the logic at the time the function is received.

X710 - Stop

This function causes the processor to stop running.

X720 - Go

This function allows the processor to start running.

X740 - Master Clear

This function clears processor and device interface logic.

CYBER Channel Interface Diagnostic Functions

The CYBER channel interface has two separate paths through which PP data can reach the coupler memory. One path uses the Universal Device Interface (UDI) module and assembles data under microcode control. The other path uses Direct Memory Access (DMA) to assemble data under hardware control. The following functions are used to test these paths. The octal function codes are not given as they differ for the various devices that may be attached to the coupler. Refer to the specific subsystem user's guide for the applicable function codes.

- UDI Read
- UDI Write
- DMA Read
- DMA Write

UDI Read

The UDI read function allows the PP to read 322 12-bit words from the coupler memory. This function uses the same hardware path as the status functions. The coupler outputs the 12 rightmost bits of each 16-bit memory word. It can be used to read the data previously written with the UDI write function.

UDI Write

The UDI write function allows the PP to write 322 12-bit words into the coupler memory. This function uses the same hardware as functions that send parameters. The 12-bit channel word is stored in the 12 rightmost bits of the 16-bit memory word. General status is 5000 if there is a channel parity error or less than 322 words are received by the coupler. A general status of zero indicates the function completed without error.

DMA Read

The DMA read function allows the PP to read 322 12-bit words from the coupler memory. It uses the same hardware path as the read function (0004). The 322 12-bit words are stored in the 8 leftmost bits of the 16-bit words in the 483-word coupler memory buffer. This buffer contains the last record written to the disk, read from the disk, or written by the DMA write function. A general status of zero indicates the function completed without error.

DMA Write

The DMA write function allows the PP to write 322 12-bit words into the coupler memory. It uses the same hardware path as the write function (0005). The 322 12-bit words are stored in the 8 leftmost bits of the 16-bit words in the 483-word coupler memory buffer. A general status of zero indicates the function completed without error.

0070-FIPS Device I/F Diagnostics Function

This function tests the FIPS device interface logic circuits. It allows the PP to run the same FIPS device interface diagnostics run during a full-autoload coupler microcode from PP function (0414). The diagnostic tests include loading and reading the transfer registers, loading and reading conversion tables, transmitting fixed data patterns from memory to the transmitters, and transmitting fixed data patterns from the receivers to memory. If the diagnostic executes without error, the general status returned to the PP is zero. If an error is detected, the general status is 5XXX, where XXX is an error code. (Refer to coupler internal diagnostic error codes described earlier.)

CYBER Channel Parity Error Detection and Processing

CYBER channel parity errors are detected on all PP functions and all PP read/write operations to the coupler. The types of channel parity errors and their methods of processing are described in the following paragraphs.

Channel Parity Error on Function from PP

The coupler does not reply to a function from the PP having a parity error. The PP must time out the function to avoid hanging the channel. After the time-out, the PP should disconnect the channel and resend the function to the coupler. The operation must be aborted if parity errors continue.

Parity Error on PP Write

The PP completes the write operation in a normal manner after detection of a parity error on a PP write function. The PP should then send a general status function (0012) to the coupler. The coupler microcode prepares the status words in its memory and a general status of 5000 is returned to the PP. The PP should then send a extended detailed status function (0023) to the coupler and the coupler responds with bit 6 of detailed status word 18 set to indicate a write parity error. The PP should resend the write function and parameters or data to recover from the parity error. The operation must be aborted if parity errors continue.

NOTE

If parity errors occur during general or extended detailed status functions, refer to the Channel Parity Error on Function from PP and Parity Error on PP Read (Parameters or Data) paragraphs.

Parity Error on PP Read (Parameters or Data)

Prior to sending the next function, the PP should test the appropriate bit in the status and control register after the data block input. The coupler microcode does not detect a parity error on a PP read, and only general status indicates a coupler error. The PP must take one of the following actions after detecting the parity error.

- Resend the function and reread the parameters or data.
- Reseek and read the record.
- Reseek and read the block of records.
- Abort the operation if parity errors continue.

Deadman Timer Feature

The coupler hardware incorporates a deadman timeout feature that prevents the PP channel from hanging for an extended period of time. The deadman timer is enabled for all functions that transfer data between the PP and the coupler. Each time a Full or Empty signal is transferred across the channel, the deadman timer is reset to zero and the time-out period is reinitiated. When the PP deactivates the channel, the deadman timer is set to zero. If a data transfer hangs up, a time-out period of 7 to 10 seconds expires and an Inactive signal is sent to the PP.

For read/write functions to the disk, DMA write operations, and DMA read operations, the microcode prevents deadman timeouts. If the data transfer does not complete or the channel is not deactivated for these functions, the microcode deactivates the channel. General and detailed status describe the error.

For the remaining functions that transfer words between the PP and the coupler (connect, seek, format pack, and UDI write), the deadman timer is used. A general status of 5000 and a deadman timeout status in detailed status word 18 is returned for these functions if the deadman timer unhangs the channel.

Coupler Memory Locations

The following coupler memory locations provide pertinent status and operating information that can be examined by the customer engineer during troubleshooting. Refer to the CYBER Channel Coupler FR205-A/B, FV720-A/B Hardware Reference Manual listed in About This Manual for additional information on these addresses.

Processor Addresses

Address	Contents
0004_{16}	Read Data
0005_{16}	Current Instruction
0006_{16}	P Register
0007_{16}	A Register
0008_{16}	B1 Register
0009_{16}	B2 Register
$000A_{16}$	S1 Register
$000B_{16}$	S2 Register
$000C_{16}$	S3 Register
$000D_{16}$	S4 Register
$000E_{16}$	Status

CYBER Channel I/F Control Package Addresses

Address	Contents
0020_{16}	Op Code
0021_{16}	Address
0022_{16}	Length
0023_{16}	Function
0024_{16}	Status
0025_{16}	Coupler Identification

FIPS Device I/F Control Package Addresses

Address	Contents
0028_{16}	Starting Address of FIPS Control Sequence ($1C00_{16}$)
0029_{16}	Device Address
$002A_{16}$	Control Sequence Ending Status
$002B_{16}$	Control Sequence Execution Address
$002C_{16}$	Request In
$002D_{16}$	Ending Status for Aborted FIPS Transfer
$002E_{16}$	Delay Count
2000_{16}	Buffer Starting Address

Coupler Maintenance Board

The maintenance board at location A14 provides a means for reading memory locations from either the FR205 or FV720 coupler. To use the maintenance board switches and indicators shown in figure 2-2, first place the OPTION-A, NORMAL, OPTION-B switch in the NORMAL position. Next, use the address select switches to dial in the desired memory address to be read. Then, place the OPTION-A, NORMAL, OPTION-B switch to either OPTION-A (for FR205) or OPTION-B (for FV720) to read the contents of the memory address specified. This stops the processor, and the memory contents appear in the 16-LED memory display in hexadecimal notation. Successive memory locations may be read by dialing in the desired addresses with the address select switches. Return the selector switch to the ON-LINE position when through. This restarts the processor.

The NORMAL position of the OPTION-A, NORMAL, OPTION-B switch allows the maintenance board to be a memory mapped display shared by either coupler. That is, either coupler can write to the display. However, the FR205 coupler has priority over the FV720.

The maintenance board also contains four other LED indicators. The PARITY LED indicates a parity error when lit. If the FV720 writes to the memory display, the OPTION-B LED lights. If the FR205 writes to the memory display, the OPTION-A LED lights. If either the FR205 or FV720 writes to the memory display during normal mode, the corresponding LED lights for the last coupler that received write data.

HPA/MALET/DEMOT Execution

The following paragraphs provide information for running HPA (Hardware Performance Analyzer) to obtain equipment and media performance reports, and to execute diagnostics under MALET (Maintenance Application Language for Equipment Testing), and DEMOT (Diagnostic Executive Monitor for Offline Testing). MALET is part of the Concurrent Maintenance Library (CML) and DEMOT is part of the Maintenance Software Library (MSL).

HPA Execution

HPA runs under the network operating system (NOS). The following steps provide a rudimentary method for running HPA to obtain an intervention report. Refer to the HPA User Reference Manual listed in About This Manual for complete HPA information.

1. Execute HPA by typing in the following information for NOS.

```
X.DIS.
USER,username,password,family.
CHARGE,account parameters.
GETLOG.
NORM.
HPA.
*
```

2. Examine the HPA output listing for a system-related intervention report.
3. Use the PP channel/equipment/drive numbers from the intervention report when running diagnostics if the equipment status table (EST) ordinal for the equipment is not known.

MALET/DEMOT Execution

MALET is a computer maintenance language that runs under NOS. The coupler down-line diagnostics can be executed on-line under MALET. DEMOT provides similar capabilities in the off-line environment. The following paragraphs describe typical methods of placing MALET and DEMOT in execution and assigning a drive for testing. The two on-line MALET procedures require that the following conditions to be satisfied before starting. Refer to the CML Reference Manual listed in About This Manual for additional MALET information.

- Before executing MALET, the operating system must be placed in engineering mode by typing the following commands at the system console according to NOS.

  ```
  UNLOCK.
  ENGR. or ENABLE, ENGR.
  LOCK.
  ```

  When diagnostic activity is complete, the operating system should be taken out of engineering mode by retyping the appropriate commands listed above.

- MALET requires a GO,jsn command from the operator before executing any of the following coupler diagnostics: CLM, CCM, NDM, or NDP.
- On some sites, access to individual diagnostics that run under MALET requires that the user identification at run time be identical to the identification used when the diagnostics were stored.

MALET (On-Line) Execution from Remote Terminal

NOTE

This procedure assumes that the coupler diagnostics are already stored on the system disk. If not, refer to the Concurrent Maintenance Library (CML) Reference Manual listed in About This Manual for information necessary to store the diagnostics.

Perform the following steps to execute on-line diagnostics from a remote terminal using MALET.

1. Telephone the computer site and explain that you will be running MALET diagnostics on the coupler. Ask the computer operator to place the operating system in engineering mode and to issue a GO,jsn command at your job's control point when requested by console message.

2. Log in to IAF (NOS) according to site-determined procedure.

3. Type one of the following sets of commands.

   a. To run NDM or NDP, type all of the following commands.

   ```
   ATTACH,NDP. (or NDM)
   ATTACH,RFILE=CLM.
   MALET(T=line length)
   ASSIGN,EST=est,AL=3 (when the equipment has an EST entry) or
   ASSIGN,EST=NO,CH=ch,EQ=0,UN=un,AL=10,DC=dc (when equipment has no EST
   entry)
   WAIT. (operator must give a Go)
   P,XXXXX. (depending on the test)
   SCRATCH=NDP. (or NDM)
   R,CLM.
   ```

   b. To run CCM, type all of the following commands.

   ```
   ATTACH,RFILE=CCM.
   MALET(T=line length)
   ASSIGN,EST=est,AL=3 (when the equipment has an EST entry) or
   ASSIGN,EST=NO,CH=ch,EQ=0,UN=un,AL=10,DC=dc (when equipment has no EST
   entry)
   WAIT. (operator must give a Go)
   P,XXXXX. (depending on the test)
   R,CCM.
   ```

CLM - LOADER AND MONITOR PROGRAM FOR THE DOWN-LINE DIAGNOSTICS
CCM - MEMORY TEST FOR THE COUPLER
NDM - MEMORY DATA TEST FOR THE COUPLER
NDP - PROCESSOR INSTRUCTION TEST

MALET (On-Line) Execution from Local Console

NOTE

This procedure assumes that the coupler diagnostics are already stored on the system disk. If not, refer to the Concurrent Maintenance Library (CML) Reference Manual listed in About This Manual for information necessary to store the diagnostics.

Perform the following steps to execute the NDM and NDP on-line diagnostics from the local system console using MALET. (This procedure runs both tests).

1. Type in the following NOS entry for the applicable procedure.

   a. To prepare the test file:

   ```
   X.DIS.
   user#.
   GET,NDP,NDM. (indirect file) or ATTACH,NDP,NDM. (direct file)
   GET,RFILE=CLM. (indirect file) or ATTACH,RFILE=CLM (direct file)
   MALET,KL.
   DROP.
   K,cp#. (control point number in NOS 1) or K,JSN. (NOS 2)
   K.A,EST=40,AL=5,DC=XX.
   ```

   b. To run the tests:

   ```
   K.SCRATCH=NDP.
   K.R,~~NLM~~. CLM
   ```

   c. When NDP completes, enter:

   ```
   K.SCRATCH=~~NDP~~. NDM.
   K.R,~~NLM~~. CLM
   ```

Perform the following steps to execute the CCM on-line diagnostics from the local system console using MALET. Type in the following NOS entry.

```
X.DIS.
user#.
GET,RFILE=CCM. (indirect file) or ATTACH,RFILE=CCM. (direct file)
MALET,KL.
DROP.
K,cp#. (control point number in NOS 1) or K,JSN. (NOS 2)
K.A,EST=40,AL=5,DC=dc.
cp#.GO. (NOS 1) or GO,JSN. (NOS 2)
K.R,CCM.
```

DEMOT (Off-Line) Execution from Local Console

Perform the following steps to execute diagnostics off-line using DEMOT. Refer to the MSL Reference Manual listed in the preface for additional DEMOT information.

1. Mount MSL tape on tape unit.

   NOTE

   When used with a 66X tape subsystem, this procedure assumes that tape microcode is loaded and intact. If not, perform coldstart procedure described in the MSL Offline Maintenance Software Library Reference Manual listed in About This Manual.

2. Press the deadstart button under console display.

3. Check default system configuration assignments on initial display.

   a. If communication channel assignments (ordinals 6, 7, and 8) conflict with disk channel(s), change system configuration by typing n. entry. For example, to change ordinal 6 to channel 05, type

      ```
      6.05.
      ```

   b. MSL may be transferred from tape to disk at this time using one of the tape-to-disk utilities (TDX,TDY,TDZ) described in the MSL Reference Manual listed in About This Manual. The tape-to-disk MSL transfer takes approximately 20 minutes.

      When the transfer completes, press the deadstart button under console display and then change system configuration ordinals 11 through 17 to enable common maintenance software executive (CMSE) loading from the appropriate drive.

4. Press carriage return (CR) to load CMSE.

5. Type

   ```
   *OV,2000.
   ```

   to place the CMSE overlay in central memory.

6. If microcode is already loaded in the coupler, go to step 7; otherwise, load microcode as follows.

   `CW,name,ch.` (name = CDC microcode deck name from disk, and ch = channel number of coupler)

7. Type one of the following command strings to bring up DEMOT from disk or tape.

   a. Disk:

```
*DP,OUTPUT
CP*4,MCX,0,5
CP*5,MLD,0,5
RU*4,100
SQ*77,1,4                (Needed only when using CMSE command buffers)
PP*4
DEMOT
RU*5,100
SQ*77,1,4                (Needed only when using CMSE command buffers)
```

   b. Tape:

```
CP*4,MCX,0,5
CP*5,MLD,0,5
RU*4,101
SQ*77,1,4                (Needed only when using CMSE command buffers)
PP*4
DEMOT
RU*5,101
```

8. Type

```
ASSIGN,CH=ch,UN=un,AL=20,DC=dc.
```

   to assign a coupler for testing.

9. Type

```
PARAM,PX=YYYY.
```

   as required.

10. Type

```
RUN,CCM.
```

Storing Controlware

The two methods for storing microcode as a permanent file on the system disk are:

- Extracting microcode from the operating system tape.
- Copying microcode from the MAxxx Install Tape.

Execute the following to extract microcode from the operating system deadstart tape.

NOS:

```
jobname,T100.
USER,username,password,family.
CHARGE,account parameters.
REQUEST,file,NT,D=PE,F=I,LB=KU.
DEFINE,MAxxx/CT=PU,M=R.
GTR,file,MAxxx.PPU/ISD.
REWIND,file.
DEFINE, COS.
GTR,file,COS.PPU/CMD.
6/7/8/9
```

Execute the following to copy microcode from the MAxxx Install Tape.

NOS:

```
jobname,T100.
USER,username,password,family.
CHARGE,account parameters.
REQUEST,file,D=PE,F=SI,LB=KU.
DEFINE,MAxxx/M=W.
COPYBR,file,MAxxx.
```

SAMs 7

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SAMs 7

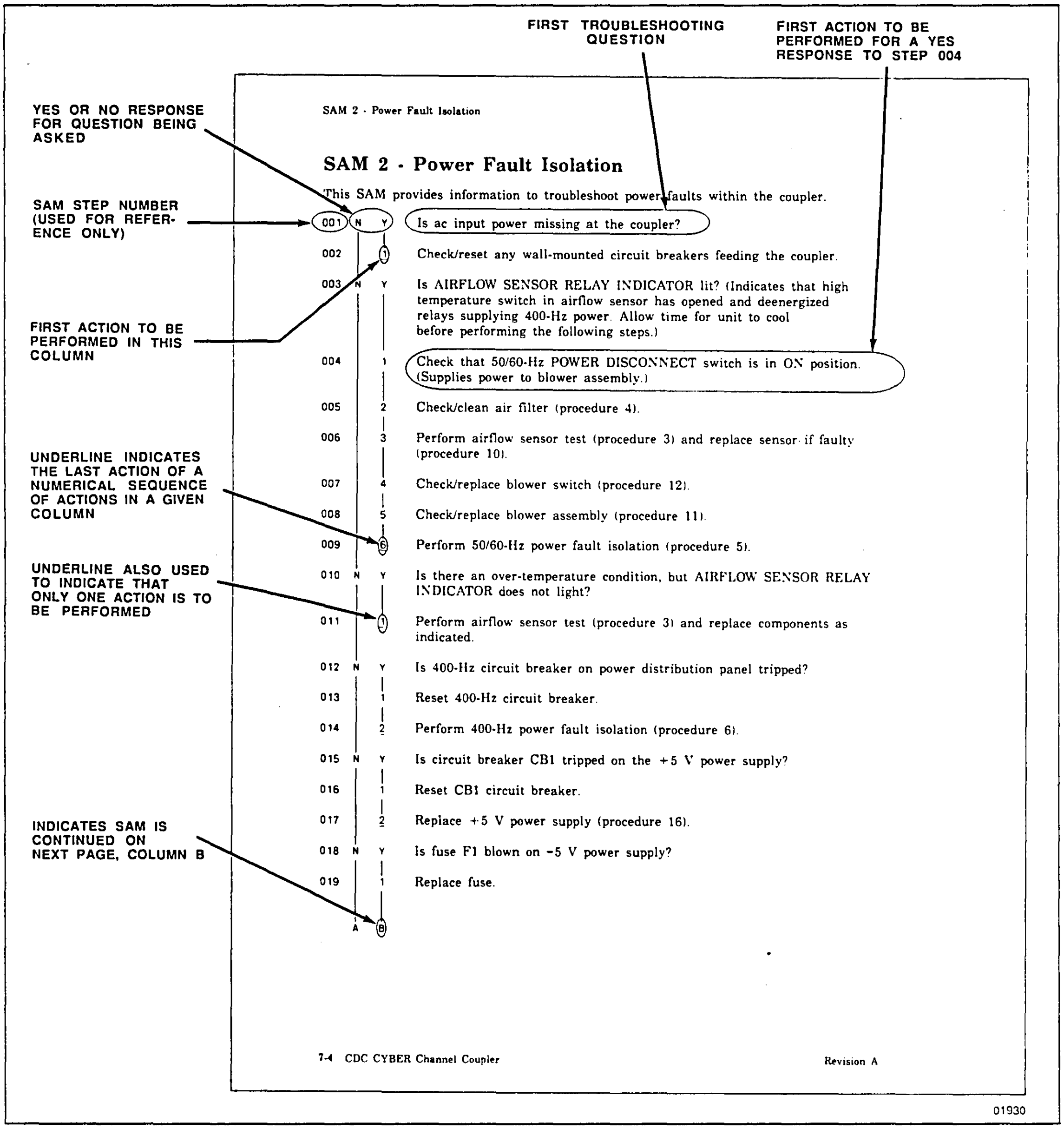
Explanation of SAM Format

The Structured Analysis Method (SAM) is used in this manual to present troubleshooting information in a logical sequence of maintenance tasks. Figure 7-1 illustrates the basic SAM format. The SAM poses questions that, when answered, lead the user to a corrective action (or sequence of actions) to be performed. The corrective actions are organized such that the action most likely to fix the problem is listed first. If more than one action is equally probable to correct the malfunction, the action requiring the least amount of time is listed first. The purpose of the SAM as well as any applicable assumptions or advisory information is provided at the beginning of the SAM document.

To interpret a SAM, start at the top of the first page and determine the response for the first question posed. Then follow the appropriate line beneath the Y or N response. Answer the next question, and so on, until the action numbers are reached. Perform the action(s) listed in that column in numerical order to correct the malfunction. A line under an action number indicates that it is the last corrective action to be performed for that particular malfunction.

Organization of SAM and Procedures

The two separate sections used for the SAMs and the remove/replace/adjust procedures are: section 7 for the SAMs and section 8 for the procedures.


FIRST TROUBLESHOOTING QUESTION
FIRST ACTION TO BE PERFORMED FOR A YES RESPONSE TO STEP 004
YES OR NO RESPONSE FOR QUESTION BEING ASKED
SAM STEP NUMBER (USED FOR REFERENCE ONLY)
FIRST ACTION TO BE PERFORMED IN THIS COLUMN
UNDERLINE INDICATES THE LAST ACTION OF A NUMERICAL SEQUENCE OF ACTIONS IN A GIVEN COLUMN
UNDERLINE ALSO USED TO INDICATE THAT ONLY ONE ACTION IS TO BE PERFORMED
INDICATES SAM IS CONTINUED ON NEXT PAGE, COLUMN B
01930

SAM 2 - Power Fault Isolation

SAM 2 - Power Fault Isolation

This SAM provides information to troubleshoot power faults within the coupler.

001	N	Y	Is ac input power missing at the coupler?
002		1	Check/reset any wall-mounted circuit breakers feeding the coupler.
003	N	Y	Is AIRFLOW SENSOR RELAY INDICATOR lit? (Indicates that high temperature switch in airflow sensor has opened and deenergized relays supplying 400-Hz power. Allow time for unit to cool before performing the following steps.)
004		1	Check that 50/60-Hz POWER DISCONNECT switch is in ON position. (Supplies power to blower assembly.)
005		2	Check/clean air filter (procedure 4).
006		3	Perform airflow sensor test (procedure 3) and replace sensor if faulty (procedure 10).
007		4	Check/replace blower switch (procedure 12).
008		5	Check/replace blower assembly (procedure 11).
009		6	Perform 50/60-Hz power fault isolation (procedure 5).
010	N	Y	Is there an over-temperature condition, but AIRFLOW SENSOR RELAY INDICATOR does not light?
011		1	Perform airflow sensor test (procedure 3) and replace components as indicated.
012	N	Y	Is 400-Hz circuit breaker on power distribution panel tripped?
013		1	Reset 400-Hz circuit breaker.
014		2	Perform 400-Hz power fault isolation (procedure 6).
015	N	Y	Is circuit breaker CB1 tripped on the +5 V power supply?
016		1	Reset CB1 circuit breaker.
017		2	Replace +5 V power supply (procedure 16).
018	N	Y	Is fuse F1 blown on -5 V power supply?
019		1	Replace fuse.
	A	B	

7-4 CDC CYBER Channel Coupler Revision A

Figure 7-1. SAM Format Example

SAM 1 - Entry SAM for Coupler Problems

This SAM is the first-level, or entry-level, SAM for isolating coupler problems. It provides information to direct the customer engineer to the appropriate SAM that should be performed for detailed fault isolation.

001	N	Y	Does the coupler fail to power up correctly?
002		1	Go to SAM 2, Power Fault Isolation.
003	N	Y	Do the internal coupler diagnostics fail to execute following a coupler power application or coupler master clear?
004		1	Replace PC boards in the following order: Chassis locations A06 and A05 (FR205) or A20 and A19 (FV720).
005	N	Y	Is there an internal coupler diagnostic test error? (Following a coupler power application or coupler master clear.)
006		1	Go to SAM 3, Internal Diagnostic and Trace Table Errors.
007	N	Y	Is there a coupler down-line diagnostic test error? (CLM, CCM, NDM, and NDP diagnostic tests.)
008		1	Go to the applicable SAM for the particular down-line diagnostic test as follows: SAM 4 for test CLM, SAM 5 for test CCM, SAM 6 for test NDM, and SAM 7 for test NDP.
009	N	Y	Is there a coupler autoload problem?
010		1	Check I/O cables between coupler and PP.
011		2	Verify that the correct microcode identification number and revision number are stored in the following RAM locations of coupler. $003C_{16}$ last four digits of microcode ID (in hexadecimal) $003D_{16}$ microcode revision number (in hexadecimal)
012		3	Go to SAM 3 and execute the internal diagnostics for additional error isolation.
013	1		Go to the beginning of this SAM and recheck all conditions to see if any fit the symptoms present. If not, try running the internal diagnostics and/or the down-line diagnostics to aid in isolating the problem. Refer to the Maintenance Aids portion of section 6 for a description of the various coupler diagnostic tests available.

SAM 2 - Power Fault Isolation

This SAM provides information to troubleshoot power faults within the coupler.

001	N	Y	Is ac input power missing at the coupler?
002		1	Check/reset any wall-mounted circuit breakers feeding the coupler.
003	N	Y	Is AIRFLOW SENSOR RELAY INDICATOR lit? (Indicates that high temperature switch in airflow sensor has opened and deenergized relays supplying 400-Hz power. Allow time for unit to cool before performing the following steps.)
004		1	Check that 50/60-Hz POWER DISCONNECT switch is in ON position. (Supplies power to blower assembly.)
005		2	Check/clean air filter (procedure 4).
006		3	Perform airflow sensor test (procedure 3) and replace sensor if faulty (procedure 10).
007		4	Check/replace blower switch (procedure 12).
008		5	Check/replace blower assembly (procedure 11).
009		6	Perform 50/60-Hz power fault isolation (procedure 5).
010	N	Y	Is there an over-temperature condition, but AIRFLOW SENSOR RELAY INDICATOR does not light?
011		1	Perform airflow sensor test (procedure 3) and replace components as indicated.
012	N	Y	Is 400-Hz circuit breaker on power distribution panel tripped?
013		1	Reset 400-Hz circuit breaker.
014		2	Perform 400-Hz power fault isolation (procedure 6).
015	N	Y	Is circuit breaker CB1 tripped on the +5 V power supply?
016		1	Reset CB1 circuit breaker.
017		2	Replace +5 V power supply (procedure 16).
018	N	Y	Is fuse F1 blown on −5 V power supply?
019		1	Replace fuse.
	A	B	

	A	B	
020		2	Replace −5 V power supply (procedure 16).
021	N	Y	Does percentage meter pointer remain at left side of scale when measuring either +5 V or −5 V?
022		1	Perform 400-Hz power fault isolation (procedure 6).
023	N	Y	Is TEST EQUIPMENT circuit breaker (CB2) tripped on power distribution panel?
024		1	Unplug any power cords plugged into convenience outlet and reset circuit breaker CB2. (External equipment may be drawing more than 7 A.)
	1		For other power problems, refer to the power distribution diagram in section 5, and troubleshoot accordingly.

SAM 3 - Internal Diagnostic and Trace Table Errors

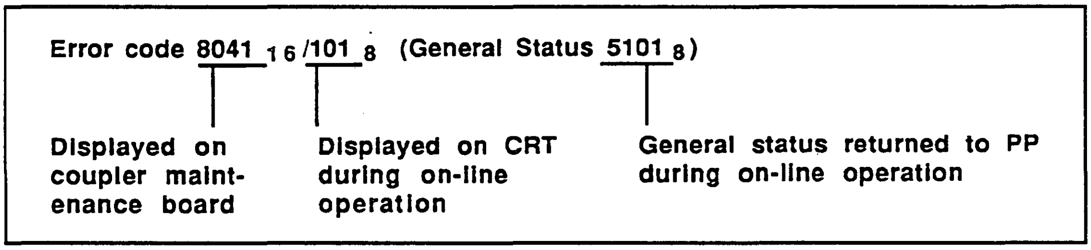
This SAM is for isolating errors detected by the internal diagnostics and the CYBER channel microcode trace tables of the coupler. The internal diagnostics can be run either off-line or on-line. Refer to section 6 for descriptions of the various internal diagnostic tests. Also refer to appendix A for information on the CYBER channel trace tables, to section 2 for a description of the diagnostic LEDS contained on the PC boards, and to procedure 23 in section 8 for logic card replacement information.

NOTE

To run the internal coupler diagnostics off-line, perform the following steps. (If CYBER channel I/O cables are not connected, the 10-MHz clock is not present; therefore, remove PC board at location 01 in order to run the diagnostics. Note that the CYBER channel logic is not tested with the PC board removed.)

1. Place OPTION-A, NORMAL, OPTION-B switch on coupler maintenance board to NORMAL position.
2. Press pushbutton MASTER CLEAR switch on PC board at location A04 (FR205) or A18 (FV720). (Or apply power to coupler per procedure 1.)
3. Observe 16-LED memory display on maintenance board for a detected error code or a successful completion code of 8800_{16}. (8800_{16} indicates successful completion only if no LEDs remain lit on PC boards.)

The SAM format for the error code information is as follows.


Error code 8041 16/101 8 (General Status 5101 8)
Displayed on coupler maint-enance board
Displayed on CRT during on-line operation
General status returned to PP during on-line operation

M01921

001 N Y Error code 1000_{16} displayed? (Processor is stopped.)

002 1 Verify that the OPTION-A, NORMAL, OPTION-B switch on coupler maintenance board is in the NORMAL position.

A B

	A	B	
003		2	Replace PC boards in the following order: Chassis locations A05 and A06 (FR205) or A19 and A20 (FV720).
004	N	Y	Error code of 1101_{16} through 1106_{16} displayed? (Derived from the CYBER channel trace tables; see appendix A.)
005		1	Replace PC boards in the following order: Chassis locations A03, A02, A04, and A01 (FR205) or A17, A16, A18, and A15 (FV720). (PC board at location A01 (FR205) or A15 (FV720) may require tuning; refer to Clock Tuning Procedure in section 3.)
006	N	Y	Error code of 1301_{16} through 1348_{16} displayed? (Derived from the CYBER channel trace tables; see appendix A.)
007		1	Replace PC boards in the following order: Chassis locations A03, A02, A04, and A01 (FR205) or A17, A16, A18, and A15 (FV720). (PC board at location A01 (FR205) or A15 (FV720) may require tuning; refer to section 3.)
008	N	Y	Error code 8000_{16} displayed?
009		1	Replace PC boards in the following order: Chassis locations A05 and A06 (FR205) or A19 and A20 (FV720).
010	N	Y	Error code 8001_{16} displayed?
011		1	Replace PC board at chassis location A07 (FR205) or A21 (FV720).
012	N	Y	Error code 8002_{16} displayed?
013		1	Replace PC board at chassis location A07 (FR205) or A21 (FV720).
014	N	Y	Error code 8003_{16} displayed?
015		1	Replace PC board at chassis location A07 (FR205) or A21 (FV720).
016	N	Y	Error code 8004_{16} displayed?
017		1	Replace PC boards in the following order: Chassis locations A01, A02, A03, A04, A05, and A06 (FR205) or A15, A16, A17, A18, A19, and A20 (FV720). (PC board at location A01 (FR205) or A15 (FV720) may require tuning; refer to section 3.)
018	N	Y	Error code 8005_{16} displayed?
019		1	Replace PC board at chassis location A07 (FR205) or A21 (FV720).
020		2	Replace each of the remaining PC boards one at a time.
	C	D	

	C	D	
021	N	Y	Error code 8006_{16} displayed?
022		1	Replace PC board at chassis location A02 (FR205) or A16 (FV720).
023		2	Replace each of the remaining PC boards one at a time.
024	N	Y	Error code 8007_{16} displayed?
025		1	Replace PC boards in the following order: Chassis locations A02, A03, and A07 (FR205) or A16, A17, and A21 (FV720).
026	N	Y	Error code $8040_{16}/100_8$ displayed? (General status 5100_8.)
027		1	Set equipment type in switches SW1-2, SW1-3, and SW1-4 on PC board at chassis location A04 (FR205) or A18 (FV720). (These switches specify equipment type connected to coupler.)
028	N	Y	Error code $8051_{16}/121_8$ displayed? (General status 5121_8.)
029		1	Replace PC boards at chassis locations A11 and A13 (FR205) or A25 and A27 (FV720).
030	N	Y	Error code $8052_{16}/122_8$ displayed? (General status 5122_8.)
031		1	Replace PC boards at chassis locations A12 and A13 (FR205) or A26 and A27 (FV720).
032	N	Y	Error code $8053_{16}/123_8$ displayed? (General status 5123_8.)
033		1	Replace PC board at chassis location A07 (FR205) or A21 (FV720).
034	N	Y	Error code $8054_{16}/124_8$ displayed? (General status 5124_8.)
035		1	Replace PC board at chassis location A13 (FR205) or A27 (FV720).
036	N	Y	Error code $8055_{16}/125_8$ displayed? (General status 5125_8.)
037		1	Replace PC board at chassis location A13 (FR205) or A27 (FV720).
038	N	Y	Error code $8056_{16}/126_8$ displayed? (General status 5126_8.)
039		1	Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)
040	N	Y	Error code $8057_{16}/127_8$ displayed? (General status 5127_8.)
	E	F	

E F

041 1 Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)

042 N Y Error code 8058$_{16}$/130$_8$ displayed? (General status 5130$_8$.)

043 1 Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)

044 N Y Error code 8059$_{16}$/131$_8$ displayed? (General status 5131$_8$.)

045 1 Check seating/condition of Bus Out and Tag Out cables.

046 N Y Error code 805A$_{16}$/132$_8$ displayed? (General status 5132$_8$.)

047 1 Replace PC boards at chassis locations A08, A13, and A10 (FR205) or A22, A27, and A24 (FV720).

048 N Y Error code 805B$_{16}$/133$_8$ displayed? (General status 5133$_8$.)

049 1 Replace PC board at chassis location A13 (FR205) or A27 (FV720), check Bus Out/Tag Out cables, and check external device.

050 N Y Error code 805C$_{16}$/134$_8$ displayed? (General status 5134$_8$.)

051 1 Replace PC board at chassis location A10 (FR205) or A24 (FV720), check Bus Out/Tag Out cables, and check external device.

052 N Y Error code 805D$_{16}$/135$_8$ displayed? (General status 5135$_8$.)

053 1 Replace PC board at chassis location A02 (FR205) or A16 (FV720), check Bus Out/Tag Out cables, and check external device.

054 N Y Error code 805E$_{16}$/136$_8$ displayed? (General status 5136$_8$.)

055 1 Replace PC boards at chassis locations A12, A10, and A11 (FV205) or A26, A24, or A25 (FV720); check Bus Out/Tag Out cables; and check external device.

056 N Y Error code 805F$_{16}$/137$_8$ displayed? (General status 5137$_8$.)

057 1 This error code is not used.

058 N Y Error code 8061$_{16}$/141$_8$ displayed? (General status 5141$_8$.)

059 1 Replace PC boards at chassis locations A11 and A13 (FR205) or A25 and A27 (FV720).

060 N Y Error code 8062$_{16}$/142$_8$ displayed? (General status 5142$_8$.)

G H

	G	H	
061		1	Replace PC boards at chassis locations A12 and A13 (FR205) or A26 and A27 (FV720).
062	N	Y	Error code $8063_{16}/143_8$ displayed? (General status 5143_8.)
063		1	Replace PC board at chassis location A07 (FR205) or A21 (FV720).
064	N	Y	Error code $8064_{16}/144_8$ displayed? (General status 5144_8.)
065		1	Replace PC board at chassis locations A13 (FR205) or A27 (FV720).
066	N	Y	Error code $8065_{16}/145_8$ displayed? (General status 5145_8.)
067		1	Replace PC board at chassis locations A13 (FR205) or A27 (FV720).
068	N	Y	Error code $8066_{16}/146_8$ displayed? (General status 5146_8.)
069		1	Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)
070	N	Y	Error code $8067_{16}/147_8$ displayed? (General status 5147_8.)
071		1	Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)
072	N	Y	Error code $8068_{16}/150_8$ displayed? (General status 5150_8.)
073		1	Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)
074	N	Y	Error code $8069_{16}/151_8$ displayed? (General status 5151_8.)
075		1	Check seating/condition of Bus Out and Tag Out cables.
076	N	Y	Error code $806A_{16}/152_8$ displayed? (General status 5152_8.)
077		1	Replace PC boards at chassis locations A08, A13, and A10 (FR205) or A22, A27, and A24 (FV720).
078	N	Y	Error code $806B_{16}/153_8$ displayed? (General status 5153_8.)
079		1	Replace PC board at chassis location A13 (FR205) or A27 (FV720), check Bus Out/Tag Out cables, and check external device.
080	N	Y	Error code $806C_{16}/154_8$ displayed? (General status 5154_8.)
	I	J	

I J

081 1 Replace PC board at chassis location A10 (FR205) or A24 (FV720), check Bus Out/Tag Out cables, and check external device.

082 N Y Error code $806D_{16}/155_8$ displayed? (General status 5155_8.)

083 1 Replace PC board at chassis location A02 (FR205) or A16 (FV720), check Bus Out/Tag Out cables, and check external device.

084 N Y Error code $806E_{16}/156_8$ displayed? (General status 5156_8.)

085 1 Replace PC boards at chassis locations A12, A10, and A11 (FR205) or A26, A24, and A25 (FV720); check Bus Out/Tag Out cables; and check external device.

086 N Y Error code $806F_{16}/157_8$ displayed? (General status 5157_8.)

087 1 This error code is not used.

088 N Y Error code 8070_{16} displayed? (General status 5160_8.)

089 1 Replace PC board at chassis locations A08 and A09 (FR205) or A22 and A23 (FV720).

090 N Y Error code $8071_{16}/161_8$ displayed? (General status 5161_8.)

091 1 Replace PC boards at chassis locations A11 and A13 (FR205) or A25 and A27 (FV720).

092 N Y Error code $8072_{16}/162_8$ displayed? (General status 5162_8.)

093 1 Replace PC boards at chassis locations A12 and A13 (FR205) or A26 and A27 (FV720).

094 N Y Error code $8073_{16}/163_8$ displayed? (General status 5163_8.)

095 1 Replace PC board at chassis location A07 (FR205) or A21 (FV720).

096 N Y Error code $8074_{16}/164_8$ displayed? (General status 5164_8.)

097 1 Replace PC board at chassis location A13 (FR205) or A27 (FV720).

098 N Y Error code $8075_{16}/165_8$ displayed? (General status 5165_8.)

099 1 Replace PC board at chassis location A13 (FR205) or A27 (FV720).

100 N Y Error code $8076_{16}/166_8$ displayed? (General status 5166_8.)

101 1 Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)

102 N Y Error code $8077_{16}/167_8$ displayed? (General status 5167_8.)

K L

K L

103 1 Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)

104 N Y Error code $8078_{16}/170_8$ displayed? (General status 5170_8.)

105 1 Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)

106 N Y Error code $8079_{16}/171_8$ displayed? (General status 5171_8.)

107 1 Check seating/condition of Bus Out and Tag Out cables.

108 N Y Error code $807A_{16}/172_8$ displayed? (General status 5172_8.)

109 1 Replace PC boards at chassis locations A08, A13, and A10 (FR205) or A22, A27, and A24 (FV720).

110 N Y Error code $807B_{16}/173_8$ displayed? (General status 5173_8.)

111 1 Replace PC board at chassis location A13 (FR205) or A27 (FV720), check Bus Out/Tag Out cables, and check external device.

112 N Y Error code $807C_{16}/174_8$ displayed? (General status 5174_8.)

113 1 Replace PC board at chassis location A10 (FR205) or A24 (FV720), check Bus Out/Tag Out cables, and check external device.

114 N Y Error code $807D_{16}/175_8$ displayed? (General status 5175_8.)

115 1 Replace PC board at chassis location A02 (FR205) or A16 (FV720), check Bus Out/Tag Out cables, and check external device.

116 N Y Error code $807E_{16}/176_8$ displayed? (General status 5176_8.)

117 1 Replace PC boards at chassis locations A12, A10, and A11 (FR205) or A26, A24, or A25 (FV720); check Bus Out/Tag Out cables; and check external device.

118 N Y Error code $807F_{16}/177_8$ displayed? (General status 5177_8.)

119 1 This error code is not used.

120 N Y Error code $8080_{16}/200_8$ displayed? (General status 5200_8.)

121 1 Replace PC boards at chassis locations A08, A10, and A11 (FR205) or A22, A24, and A25 (FV720).

122 N Y Error code $8081_{16}/201_8$ displayed? (General status 5201_8.)

M O

	M	O	
123		1	Replace PC boards at chassis locations A11 and A13 (FR205) or A25 and A27 (FV720).
124	N	Y	Error code $8082_{16}/202_8$ displayed? (General status 5202_8.)
125		1	Replace PC boards at chassis locations A12 and A13 (FR205) or A26 and A27 (FV720).
126	N	Y	Error code $8083_{16}/203_8$ displayed? (General status 5203_8.)
127		1	Replace PC board at chassis location A07 (FR205) or A21 (FV720).
128	N	Y	Error code $8084_{16}/204_8$ displayed? (General status 5204_8.)
129		1	Replace PC board at chassis location A13 (FR205) or A27 (FV720).
130	N	Y	Error code $8085_{16}/205_8$ displayed? (General status 5205_8.)
131		1	Replace PC board at chassis location A13 (FR205) or A27 (FV720).
132	N	Y	Error code $8086_{16}/206_8$ displayed? (General status 5206_8.)
133		1	Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)
134	N	Y	Error code $8087_{16}/207_8$ displayed? (General status 5207_8.)
135		1	Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)
136	N	Y	Error code $8088_{16}/210_8$ displayed? (General status 5210_8.)
137		1	Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)
138	N	Y	Error code $8089_{16}/211_8$ displayed? (General status 5211_8.)
139		1	Check seating/condition of Bus Out and Tag Out cables.
140	N	Y	Error code $808A_{16}/212_8$ displayed? (General status 5212_8.)
141		1	Replace PC boards at chassis locations A08, A13, and A10 (FR205) or A22, A27, and A24 (FV720).
142	N	Y	Error code $808B_{16}/213_8$ displayed? (General status 5213_8.)
	P	Q	

P Q

143 1 Replace PC board at chassis location A13 (FR205) or A27 (FV720), check Bus Out/Tag Out cables, and check external device.

144 N Y Error code $808C_{16}/214_8$ displayed? (General status 5214_8.)

145 1 Replace PC board at chassis location A10 (FR205) or A24 (FV720), check Bus Out/Tag Out cables, and check external device.

146 N Y Error code $808D_{16}/215_8$ displayed? (General status 5215_8.)

147 1 Replace PC board at chassis location A02 (FR205) or A16 (FV720), check Bus Out/Tag Out cables, and check external device.

148 N Y Error code $808E_{16}/216_8$ displayed? (General status 5216_8.)

149 1 Replace PC boards at chassis locations A12, A10, and A11 (FR205) or A26, A24, and A25 (FV720); check Bus Out/Tag Out cables; and check external device.

150 N Y Error code $808F_{16}/217_8$ displayed? (General status 5217_8.)

151 1 This error code is not used.

152 N Y Error code $8090_{16}/220_8$ displayed? (General status 5220_8.)

153 1 Replace PC boards at chassis locations A13, A11, and A10 (FR205) or A27, A25, and A24 (FV720).

154 N Y Error code $8091_{16}/221_8$ displayed? (General status 5221_8.)

155 1 Replace PC boards at chassis locations A07, A11, and A13 (FR205) or A21, A25, and A27 (FV720).

156 N Y Error code $8092_{16}/222_8$ displayed? (General status 5222_8.)

157 1 Replace PC boards at chassis locations A12 and A13 (FR205) or A26 and A27 (FV720).

158 N Y Error code $8093_{16}/223_8$ displayed? (General status 5223_8.)

159 1 Replace PC board at chassis location A07 (FR205) or A21 (FV720).

160 N Y Error code $8094_{16}/224_8$ displayed? (General status 5224_8.)

161 1 Replace PC board at chassis location A13 (FR205) or A27 (FV720).

162 N Y Error code $8095_{16}/225_8$ displayed? (General status 5225_8.)

163 1 Replace PC board at chassis location A13 (FR205) or A27 (FV720).

164 N Y Error code $8096_{16}/226_8$ displayed? (General status 5226_8.)

R S

R S

165 1 Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)

166 N Y Error code $8097_{16}/227_8$ displayed? (General status 5227_8.)

167 1 Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)

168 N Y Error code $8098_{16}/230_8$ displayed? (General status 5230_8.)

169 1 Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)

170 N Y Error code $8099_{16}/231_8$ displayed? (General status 5231_8.)

171 1 Check seating/condition of Bus Out and Tag Out cables.

172 N Y Error code $809A_{16}/232_8$ displayed? (General status 5232_8.)

173 1 Replace PC boards at chassis locations A08, A13, and A10 (FR205) or A22, A27, and A24 (FV720).

174 N Y Error code $809B_{16}/233_8$ displayed? (General status 5233_8.)

175 1 Replace PC board at chassis location A13 (FR205) or A27 (FV720), check Bus Out/Tag Out cables, and check external device.

176 N Y Error code $809C_{16}/234_8$ displayed? (General status 5234_8.)

177 1 Replace PC board at chassis location A10 (FR205) or A24 (FV720), check Bus Out/Tag Out cables, and check external device.

178 N Y Error code $809D_{16}/235_8$ displayed? (General status 5235_8.)

179 1 Replace PC board at chassis location A02 (FR205) or A16 (FV720), check Bus Out/Tag Out cables, and check external device.

180 N Y Error code $809E_{16}/236_8$ displayed? (General status 5236_8.)

181 1 Replace PC boards at chassis locations A12, A10, and A11 (FR205) or A26, A24, and A25 (FV720); check Bus Out/Tag Out cables; and check external device.

182 N Y Error code $809F_{16}/237_8$ displayed? (General status 5237_8.)

183 1 This error code is not used.

184 N Y Error code $80A0_{16}/240_8$ displayed? (General status 5240_8.)

T U

T U

185 1 Replace PC boards at chassis locations A08 and A11 (FR205) or A22 and A25 (FV720).

186 N Y Error code $80A8_{16}/250_8$ displayed? (General status 5250_8.)

187 1 Replace PC boards at chassis locations A08 and A11 (FR205) or A22 and A25 (FV720).

188 N Y Error code $80A9_{16}/251_8$ displayed? (General status 5251_8.)

189 1 Replace PC board at chassis location A08 (FR205) or A22 (FV720).

190 N Y Error code $80AA_{16}/252_8$ displayed? (General status 5252_8.)

191 1 Replace PC boards at chassis locations A13 and A11 (FR205) or A27 and A25 (FV720).

192 N Y Error code $80AB_{16}/253_8$ displayed? (General status 5253_8.)

193 1 Replace PC boards at chassis locations A08, A11, A12, and A09 (FR205) or A22, A25, A26, and A23 (FV720).

194 N Y Error code $80AC_{16}/254_8$ displayed? (General status 5254_8.)

195 1 Replace PC board at chassis location A10 (FR205) or A24 (FV720).

196 N Y Error code $80AD_{16}/255_8$ displayed? (General status 5255_8.)

197 1 Replace PC boards at chassis locations A13 and A10 (FR205) or A27 and A24 (FV720).

198 N Y Error code $80B1_{16}/261_8$ displayed? (General status 5261_8.)

199 1 Replace PC boards at chassis locations A11 and A13 (FR205) or A25 and A27 (FV720).

200 N Y Error code $80B2_{16}/262_8$ displayed? (General status 5262_8.)

201 1 Replace PC boards at chassis locations A12 and A13 (FR205) or A26 and A27 (FV720).

202 N Y Error code $80B3_{16}/263_8$ displayed? (General status 5263_8.)

203 1 Replace PC board at chassis location A07 (FR205) or A21 (FV720).

204 N Y Error code $80B4_{16}/264_8$ displayed? (General status 5264_8.)

205 1 Replace PC board at chassis location A13 (FR205) or A27 (FV720).

206 N Y Error code $80B5_{16}/265_8$ displayed? (General status 5265_8.)

V W

V W

207 1 Replace PC board at chassis location A13 (FR205) or A27 (FV720).

208 N Y Error code $80B6_{16}/266_8$ displayed? (General status 5266_8.)

209 1 Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)

210 N Y Error code $80B7_{16}/267_8$ displayed? (General status 5267_8.)

211 1 Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)

212 N Y Error code $80B8_{16}/270_8$ displayed? (General status 5270_8.)

213 1 Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have have a grounded signal.)

214 N Y Error code $80B9_{16}/271_8$ displayed? (General status 5271_8.)

215 1 Check seating/condition of Bus Out and Tag Out cables.

216 N Y Error code $80BA_{16}/272_8$ displayed? (General status 5272_8.)

217 1 Replace PC boards at chassis locations A08, A13, and A10 (FR205) or A22, A27, and A24 (FV720).

218 N Y Error code $80BB_{16}/273_8$ displayed? (General status 5273_8.)

219 1 Replace PC board at chassis location A13 (FR205) or A27 (FV720), check Bus Out/Tag Out cables, and check external device.

220 N Y Error code $80BC_{16}/274_8$ displayed? (General status 5274_8.)

221 1 Replace PC board at chassis location A10 (FR205) or A24 (FV720), check Bus Out/Tag Out cables, and check external device.

222 N Y Error code $80BD_{16}/275_8$ displayed? (General status 5275_8.)

223 1 Replace PC board at chassis location A02 (FR205) or A16 (FV720), check Bus Out/Tag Out cables, and check external device.

224 N Y Error code $80BE_{16}/276_8$ displayed? (General status 5276_8.)

225 1 Replace PC boards at chassis locations A12, A10, and A11 (FR205) or A27, A24, and A25 (FV720); check Bus Out/Tag Out cables; and check external device.

226 N Y Error code $80BF_{16}/277_8$ displayed? (General status 5277_8.)

X Z

	X	Z	
227		1	This error code is not used.
228	N	Y	Error code $80C0_{16}/300_8$ displayed? (General status 5300_8.)
229		1	Replace PC board at chassis location A10 (FR205) or A24 (FV720).
230	N	Y	Error code $80C1_{16}/301_8$ displayed? (General status 5301_8.)
231		1	Replace PC boards at chassis locations A11 and A13 (FR205) or A25 and A27 (FV720).
232	N	Y	Error code $80C2_{16}/302_8$ displayed? (General status 5302_8.)
233		1	Replace PC boards at chassis locations A12 and A13 (FR205) or A26 and A27 (FV720).
234	N	Y	Error code $80C3_{16}/303_8$ displayed? (General status 5303_8.)
235		1	Replace PC board at chassis location A07 (FR205) or A21 (FV720).
236	N	Y	Error code $80C4_{16}/304_8$ displayed? (General status 5304_8.)
237		1	Replace PC board at chassis location A13 (FR205) or A27 (FV720).
238	N	Y	Error code $80C5_{16}/305_8$ displayed? (General status 5305_8.)
239		1	Replace PC board at chassis location A13 (FR205) or A27 (FV720).
240	N	Y	Error code $80C6_{16}/306_8$ displayed? (General status 5306_8.)
241		1	Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)
242	N	Y	Error code $80C7_{16}/307_8$ displayed? (General status 5307_8.)
243		1	Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)
244	N	Y	Error code $80C8_{16}/310_8$ displayed? (General status 5310_8.)
245		1	Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). (Drivers to external device have a grounded signal.)
246	N	Y	Error code $80C9_{16}/311_8$ displayed? (General status 5311_8.)
	a	b	

	a	b	
247		1	Check seating/condition of Bus Out and Tag Out cables.
248		2	Replace PC boards at chassis locations A12 and A13 (FR205) or A27 and A27 (FV720).
249	N	Y	Error code $80CA_{16}/312_8$ displayed? (General status 5312_8.)
250		1	Replace PC boards at chassis locations A08, A13, and A10 (FR205) or A22, A27, and A24 (FV720).
251	N	Y	Error code $80CB_{16}/313_8$ displayed? (General status 5313_8.)
252		1	Replace PC board at chassis location A13 (FR205) or A27 (FV720), check Bus Out/Tag Out cables, and check external device.
253	N	Y	Error code $80CC_{16}/314_8$ displayed? (General status 5314_8.)
254		1	Replace PC board at chassis location A10 (FR205) or A24 (FV720), check Bus Out/Tag Out cables, and check external device.
255	N	Y	Error code $80CD_{16}/315_8$ displayed? (General status 5315_8.)
256		1	Replace PC board at chassis location A02 (FR205) or A16 (FV720), check Bus Out/Tag Out cables, and check external device.
257	N	Y	Error code $80CE_{16}/316_8$ displayed? (General status 5316_8.)
258		1	Replace PC boards at chassis locations A12, A10, and A11 (FR205) or A26, A24, and A25 (FV720); check Bus Out/Tag Out cables; and check external device.
259	N	Y	Error code $80CF_{16}/317_8$ displayed? (General status 5317_8.)
260		1	This error code is not used.
261	N	Y	Error code $80D8_{16}/330_8$ displayed? (General status 5330_8.)
262		1	Replace PC boards at chassis locations A13 and A10 (FR205) or A27 and A24 (FV720).
263	N	Y	Code $8101_{16}/401_8$ displayed? (General status 5401_8.)
264		1	Retry autoloading. If error persists, try different source data. Replace PC boards at chassis locations A01, A02, and A04 (FR205) or A15, A16, and A18 (FV720). Check PP I/O channel cables.
265	N	Y	Code $8102_{16}/402_8$ displayed? (General status 5402_8.)
	c	d	

c d

266 1 Retry autoloading. If error persists, try different source data. Replace PC boards at chassis locations A01, A02, and A04 (FR205) or A15, A16, and A18 (FV720). Check PP I/O channel cables.

267 N Y Code $8103_{16}/403_8$ displayed? (General status 5403_8.)

268 1 Retry autoloading. If error persists, try different source data. Replace PC boards at chassis locations A01, A02, and A04 (FR205) or A15, A16, and A18 (FV720). Check PP I/O channel cables.

269 N Y Code $8140_{16}/404_8$ displayed? (General status 5404_8.)

270 1 Replace PC board at chassis location A07 (FR205) or A21 (FV720).

271 N Y Code $8141_{16}/501_8$ displayed? (General status 5501_8.)

272 1 Retry autoloading. If error persists, try different source data and/or load device. Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). Check FIPS I/O device cables. Check external device.

273 N Y Code $8142_{16}/502_8$ displayed? (General status 5502_8.)

274 1 Retry autoloading. If error persists, try different source data and/or load device. Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). Check FIPS I/O device cables. Check external device.

275 N Y Code $8143_{16}/503_8$ displayed? (General status 5503_8.)

276 1 Retry autoloading. If error persists, try different source data and/or load device. Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). Check FIPS I/O device cables. Check external device.

277 N Y Code $8144_{16}/504_8$ displayed? (General status 5504_8.)

278 1 Retry autoloading. If error persists, try different source data and/or load device. Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). Check FIPS I/O device cables. Check external device.

279 N Y Code $8145_{16}/505_8$ displayed? (General status 5505_8.)

e f

e f

280 1 Retry autoloading. If error persists, try different source data and/or load device. Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). Check FIPS I/O device cables. Check external device.

281 N Y Code $8147_{16}/507_8$ displayed? (General status 5507_8.)

282 1 Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). Check FIPS I/O device cables. Check external device.

283 N Y Code $8148_{16}/510_8$ displayed? (General status 5510_8.)

284 1 Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). Check FIPS I/O device cables. Check external device.

285 N Y Code $820X_{16}/6OX_8$ displayed? (General status $560X_8$.)

286 1 Retry autoloading. If error persists, try different source data and/or load device. Replace PC boards at chassis locations A11, A12, and A13 (FR205) or A25, A26, and A27 (FV720). Check FIPS I/O device cables. Check external device.

287 N Y Code $8800_{16}/000_8$ displayed? (General status 0000_8.)

g h

g h

288 1 This code indicates normal completion of the internal diagnostics. when no LED indicators on the PC boards are lit. Various malfunctions can prevent the display of error codes such that an 8800$_{16}$ may be displayed even though an error exists. Therefore, examine LEDs on PC boards for possible errorsand troubleshoot as follows.

Board A04 (FR205) or A18 (FV720)

LED 1 (upper) remains lit - Replace board at locations A01 and A04 (FR205) or A15 and A18 (FV720).
LED 2 remains lit - Replace board at locations A02, A03, A05, and A06 (FR205) or A16, A17, A19, and A20 (FV720).
LED 3 remains lit - Replace board at locations A02, A03, and A04 (FR205) or A16, A17, and A18 (FV720).
LED 4 remains lit - Replace board at locations A01 and A04 (FR205) or A15 and A18 (FV720).
LED 5 remains lit - Replace board at locations A05 and A06 (FR205) or A19 and A20 (FV720).
LED 6 remains lit - Replace board at locations A02, A03, and A04 (FR205) or A16, A17, and A18 (FV720).

Board A07 (FR205) or A21 (FV720)

LED remains lit - Replace board at locations A05, A06, and A07 (FR205) or A19, A20, and A21 (FV720).

Board A11 (FR205) or A12 (FR205) or A25 (FV720) or A26 (FV720)

LED 1 (upper) remains lit - Replace board at locations A08, A09, A10, A11, A12, and A13 (FR205) or A22, A23, A24, A25, A26, and A27 (FV720).
LED 2 (lower) remains lit - Replace board at locations A11 and A12 (FR205) or A25 and A26 (FV720).

Board A14 (FR205 or FV720)

LED 1 (upper) remains lit - Replace board at location A14.
LED 2 (middle) remains lit - Indicates that the FV720 was the last coupler to write to the maintenance panel.
LED 3 (lower) remains lit - Indicates that the FR205 was the last coupler to write to the maintenance panel.

Note - If all LEDs are unlit on board A14, replace boards at locations A14, A08, and A09 (FR205) or A14, A22, and A23 (FV720).

289 N Y Code 8810$_{16}$/000$_8$ displayed? (General status 0000$_8$.)

i j

	i	j	
290		1	This code indicates that an autoload from the PP has started.
291	N	Y	Code $8820_{16}/000_8$ displayed? (General status 0000_8.)
292		1	This code indicates that an autoload from an attached disk device has started.
293	N	Y	Code $8840_{16}/000_8$ displayed? (General status 0000.)
294		1	This code indicates that the ROM resident portion of the autoload routine hassuccessfully completed.
295	N	Y	Code $8888_{16}/000_8$ displayed? (General status 0000_8.)
296		1	This code indicates that the autoload routine has successfully completed.
297	1		For any other error code being displayed, examine LEDs on PC board for possible errors. Refer to information following SAM step 288 for LED troubleshooting information. If unable to isolate problem, call Technical Support for assistance.

SAM 4 - CLM Loader/Monitor Errors

This SAM is for isolating errors reported by the CLM loader and monitor program of the PP down-line diagnostics. Refer to section 6 for CLM loader/monitor description and refer to procedure 23 for logic card replacement information.

001	N	Y	Is there a CLM00 - PARAMETER ERROR message?
002		1	Verify parameters entered for test being run.
003	N	Y	Is there a CLM01 - PAUSE IN-LINE FAILED message?
004		1	Replace PC board at location A01 (FR205) or A15 (FV720). (PC board at location A01 (FR205) or A15 (FV720) might require tuning; refer to Clock Tuning Procedure in section 3 for procedure.)
005	N	Y	Is there a PROCESSOR ERROR ON MASTER CLEAR message? (CE may continue test execution with this error for additional isolation if desired. However, some tests may not execute correctly.)
006		1	Replace RAM PC board at chassis location A07 (FR205) or A21 (FV720) of coupler.
007		2	Execute internal diagnostics per SAM 3 if problem persists.
008	N	Y	Is there a TTTMM STOPPED ON ERROR message? (TTTMM is the name of test/module that stopped.)
009		1	Replace PC boards in the following order: Chassis locations A07, A01, and A04 (FR205) or A21, A15, and A18 (FV720). (PC board at location A01 (FR205) or A15 (FV720) might require tuning; refer to section 3 for procedure.)
010	N	Y	Is there an E0002 - CHANNEL PARITY ERROR message?
011		1	Replace PC board at location A01 (FR205) or A15 (FV720). (PC board at location A01 (FR205) or A15 (FV720) might require tuning; refer to Clock Tuning Procedure in section 3 for procedure.)
012		2	Check CYBER channel I/O cables.
013	N	Y	Is there an E0003 - TEST LOADED INCORRECTLY message?
014		1	Replace PC boards in the following order: Chassis locations A07, A01, A05, and A06 (FR205) or A21, A01, A19, and A20 (FV720). (PC board at location A01 (FR205) or A15 (FV720) might require tuning; refer to Clock Tuning Procedure in section 3 for procedure.)
015	N	Y	Is there an E0004 - TEST NOT IN SYSTEM FILE message?
	A	B	

	A	B	
016		1	Attach test to be run by entering K.SCRATCH=XXX. (XXX = CCM, NDM, or NDP.)
017	N	Y	Is there a CLEAR RM TO TERMINATE TEST message?
018		1	Indicates that the repeat module switch must be turned off before the test is terminated. If left on, the loader/monitor module keeps repeating.
019	N	Y	Is there a CLM01 - CH. ACTIVE AND EMPTY ON INPUT message?
020		1	Replace PC boards at locations A01 and A04 (FR205) or A15 and A18 (FV720). (PC board at location A01 (FR205) or A15 (FV720) might require tuning; refer to Clock Tuning Procedure section 3 for procedure.)
021	N	Y	Is there a CLM01 - NO INACTIVE ON EQUIP FUNC message?
022		1	Check CYBER I/O channel assignment being used.
		2	Verify that no indicators remain lit on PC boards at chassis locations A04, A07, and A12 (FR205) or A18, A21, and A26 (FV720). (A lit indicator indicates that the internal diagnostics have detected an error. Go to SAM 3 to isolate the error.)
		3	Replace PC board at chassis location A01 (FR205) or A15 (FV720). (PC board at location A01 (FR205) or A15 (FV720) might require tuning; refer to Clock Tuning Procedure in section 3 for procedure.)
023	N	Y	Is there a CLM02 - HALT - STOPPED ON ERROR message?
024		1	Replace PC board at chassis location A07 (FR205) or A21 (FV720).
025	1		For any other CLM errors/problems, try running the internal diagnostics per SAM 3 for additional isolation. If problem persists, contact Technical Support for assistance.

SAM 5 - CCM Down-Line Diagnostic Errors

This SAM is for isolating errors detected by the CCM memory test of the PP down-line diagnostics. Refer to section 6 for CCM test description and refer to procedure 23 for logic card replacement information.

001 N Y Is there a CCM00 - SUSPECTED PARAMETER ERROR message?

002 1 Verify parameter entry in P1. (P1 must be either 0 or 1 to specify 16K RAM.)

003 N Y Is there a CCM01 - CONTROLWARE NOT RUNNING message?

004 1 Replace PC board at location A01 (FR205) or A15 (FV720). (PC board at location A01 (FR205) or A15 (FV720) might require tuning; refer to Clock Tuning Procedure in section 3 for procedure.)

005 N Y Is there a CCM01 - ----- COMPARE ----- message?

006 1 Replace PC board at location A01 (FR205) or A15 (FV720). (PC board at location A01 (FR205) or A15 (FV720) might require tuning; refer to Clock Tuning Procedure in section 3 for procedure.)

007 N Y Is there a CCM0x - ABORTED ON FUNCTION message? (The first function executed is an 0740 that tries to master clear the coupler.)

008 1 Check that CYBER channel I/O cables are present and properly seated.

009 2 Replace PC boards in the following order: Chassis locations A01, A02, A03, and A07 (FR205) or A15, A16, A17, and A21 (FV720). (PC board at location A01 (FR205) or A15 (FV720) might require tuning; refer to to Clock Tuning Procedure in section 3 for procedure.)

010 N Y Is there a CCM01 - ABORTED ON DISCONNECT COMMAND message?

011 1 Replace PC board at location A04 (FR205) or A18 (FV720).

012 N Y Is there a CCM05 - ABORTED ON EMPTY PARITY ERROR message?

A B

	A	B	
013		1	Replace PC board at location A02 (FR205) or A16 (FV720).
014	N	Y	Is there a CCM0x - ABORTED ON MEM PAR ERROR message?
015		1	Replace PC board at location A07 (FR205) or A21 (FV720).
016		2	Check for low +5 V.
017	N	Y	Is there a CCM0x - ABORTED ON COMPARE COMMAND message?
018		1	Replace PC boards in the following order: Chassis locations A07 and A01 (FR205) or A21 and A15 (FV720). (PC board at location A01 (FR205) or A15 (FV720) might require tuning; refer to Clock Tuning Procedure in section 3 for procedure.)
019	N	Y	Is there a CCM00 - RM SELECTED, PPU STATUS = PAUSE message?
020		1	Change parameter entry to turn off repeat module selection.
021	N	Y	Is there a CCM0x - MODULE WILL NOT RUN WITH AL LESS THAN 10B message?
022		1	Set access level parameter to less than 10 binary.
023	1		For any other CCM test errors/problems, try replacing PC boards at locations A07, A05, and A06 (FR205) or A21, A19, and A20 (FV720). If problem persists, try to isolate cause by running internal diagnostics per SAM 3, then contact Technical Support for assistance as needed.

SAM 6 - NDM Down-Line Diagnostic Errors

This SAM is for isolating errors detected by the NDM memory test of the PP down-line diagnostics. Refer to section 6 for NDM test description and refer to procedure 23 for logic card replacement information.

001	N	Y	Is there an NDM - PARAMETER ERROR DETECTED message?
002		1	Verify parameter entries and rerun test.
003	1		For any other type of error message reported by NDM, try replacing PC boards at locations A07, A05, and A06 (FR205) or A21, A19, and A20 (FV720). If problem persists, try to isolate cause by running internal diagnostics per SAM 3, then contact Technical Support for assistance as needed.

SAM 7 - NDP Down-Line Diagnostic Errors

This SAM is for isolating errors detected by the NDP processor test of the PP down-line diagnostics. Refer to section 6 for NDP test description and refer to procedure 23 for logic card replacement information.

001	N	Y	Is there an NDP - PARAMETER ERROR DETECTED message?
002		1	Verify parameter entries and rerun test.
003	1		For any other type of error message reported by NDP, try replacing PC boards at locations A05 and A06 (FR205) or A19 and A20 (FV720). If problem persists, try to isolate cause by running internal diagnostics per SAM 3, then contact Technical Support for assistance as needed.

Remove/Replace/Adjustment Procedures 8

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Remove/Replace/Adjustment Procedures 8

Procedure 1. Power Application/Removal

Refer to figure 8-1 for the location of switches and indicators used in this procedure.

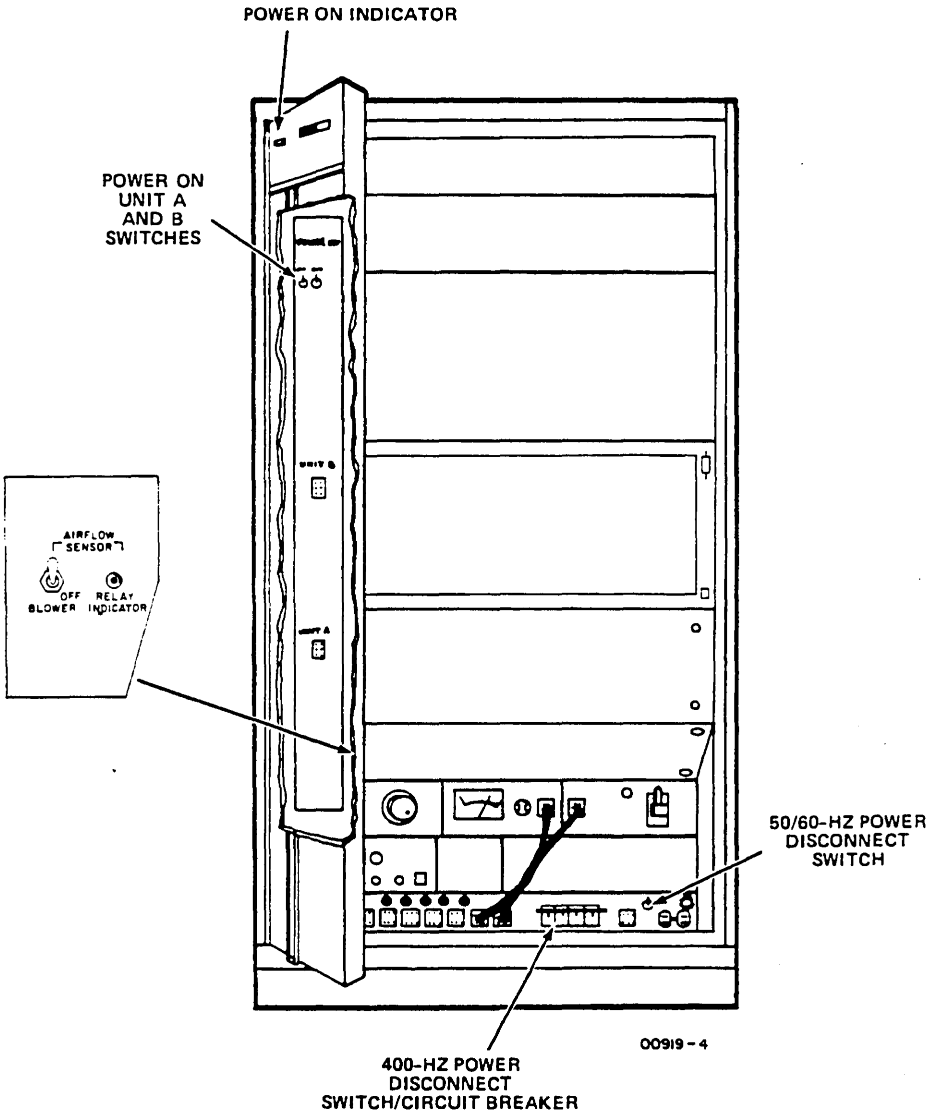
POWER ON INDICATOR
POWER ON UNIT A AND B SWITCHES
UNIT B
UNIT A
AIRFLOW SENSOR
OFF
BLOWER
RELAY INDICATOR
50/60-HZ POWER DISCONNECT SWITCH
00919-4
400-HZ POWER DISCONNECT SWITCH/CIRCUIT BREAKER

Figure 8-1. Location of Input Power Switches

To apply power to the coupler:

1. Open front cabinet door and turn 50/60-HZ POWER DISCONNECT switch ON.
2. Turn 400-HZ POWER DISCONNECT circuit breaker/switch ON. POWER ON indicator lights. If indicator fails to light, verify that site power is available and/or replace lamp (procedure 7).

NOTE

When 400-HZ POWER DISCONNECT circuit breaker is left ON while 50/60-HZ POWER DISCONNECT switch is OFF, a thermal switch drops 400-Hz input to power supplies after approximately 90 seconds. AIRFLOW SENSOR RELAY INDICATOR lights to indicate this condition.

To remove power from the coupler:

1. Turn 400-HZ POWER DISCONNECT circuit breaker/switch OFF.
2. Turn 50/60-HZ POWER DISCONNECT switch OFF.

To apply power to the attached subsystem devices:

1. Open front cabinet door and turn POWER ON UNIT A and/or UNIT B switches to ON position as applicable.

To remove power from the attached subsystem devices:

1. Turn POWER ON UNIT A and/or UNIT B switches to OFF position as applicable.

Procedure 2. Voltage Percent Meter Calibration

Perform the following steps to calibrate the voltage percentage meter of the coupler. Refer to figure 8-2 for location of controls.

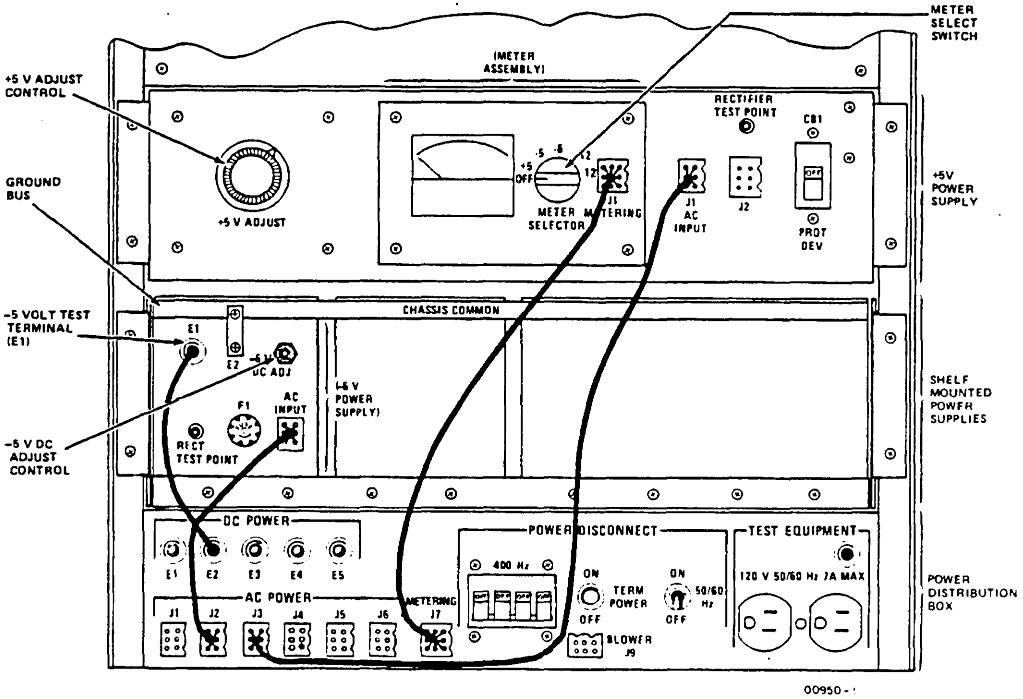

Figure 8-2. Location of Voltage Adjustment Controls

1. Apply power to coupler (procedure 1).
2. Connect digital dc voltmeter between +5 V bus bar and ground. +5 V bus bar is located at left side of cabinet as viewed from rear. Position voltmeter so it can be seen from front of coupler.
3. Turn +5 V ADJUST control until digital voltmeter shows +5 ±0.05.
4. Turn METER SELECTOR switch to +5 position. If meter shows 0 ±1 percent, meter is calibrated correctly for +5 V.
5. Connect digital dc voltmeter between -5 V terminal (E1) at front of -5 V supply and ground.
6. Adjust -5 V DC ADJ control until digital voltmeter shows -5 ±0.05.
7. Turn METER SELECTOR switch to -5 position. If meter shows 0 ±1 percent, meter is calibrated correctly for +5 V. If either the +5 V or -5 V calibration is incorrect, go to step 8.
8. Refer to figure 8-3 for assembly details and remove four screws mounting meter assembly to +5 V master power supply.

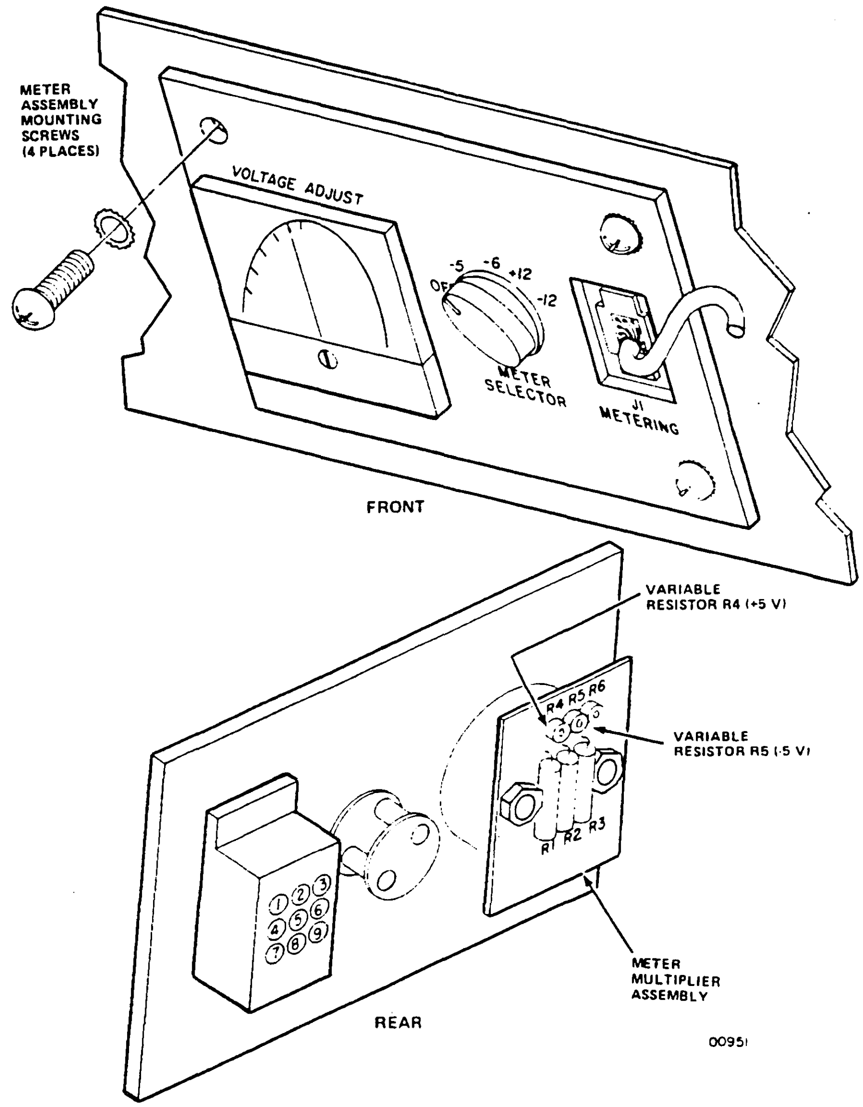
METER ASSEMBLY MOUNTING SCREWS (4 PLACES)
VOLTAGE ADJUST
OFF
-5
-6
+12
-12
METER SELECTOR
J1
METERING
FRONT
VARIABLE RESISTOR R4 (+5 V)
R4 R5 R6
VARIABLE RESISTOR R5 (-5 V)
R1 R2 R3
1 2 3
4 5 6
7 8 9
METER MULTIPLIER ASSEMBLY
REAR
00951

Figure 8-3. Meter Assembly Details

9. Turn METER SELECTOR switch to +5 position. Adjust variable resistor R4 until meter shows 0 percent.

10. Turn METER SELECTOR switch to -5. Adjust variable resistor R4 until meter shows 0 percent.

11. If both +5 V and -5 V adjustments produce 0 percent meter readings, reinstall meter assembly in +5 V master power supply. Otherwise, replace meter assembly (procedure 8).

Procedure 3. Airflow Sensor Test

Refer to figure 8-1 for input power control switch and indicator locations and perform the following steps to test the operation of the airflow sensor.

1. Turn coupler power off (procedure 1).
2. Turn 400-HZ POWER DISCONNECT circuit breaker/switch ON. POWER ON indicator lights.

   NOTE

   Leave 50/60-HZ POWER DISCONNECT switch in OFF position so that blower is not running during this test.

3. Wait approximately 90 seconds and check for the following.
   a. If POWER ON indicator goes out and AIRFLOW SENSOR RELAY INDICATOR lights, test is successful. Turn 400-HZ POWER DISCONNECT circuit breaker/switch OFF and turn 50/60-HZ POWER DISCONNECT switch ON. Allow time for unit to cool and then turn 400-HZ POWER DISCONNECT circuit breaker/switch back ON.
   b. If POWER ON indicator goes out but AIRFLOW SENSOR RELAY INDICATOR does not light, replace AIRFLOW SENSOR RELAY INDICATOR (procedure 9).
   c. If POWER ON indicator does not go out, turn 400-HZ POWER DISCONNECT circuit breaker OFF and replace airflow sensor (procedure 10).

Procedure 4. Air Filter Cleaning

To clean the cabinet input air filter, refer to figure 8-4 and perform the following steps.

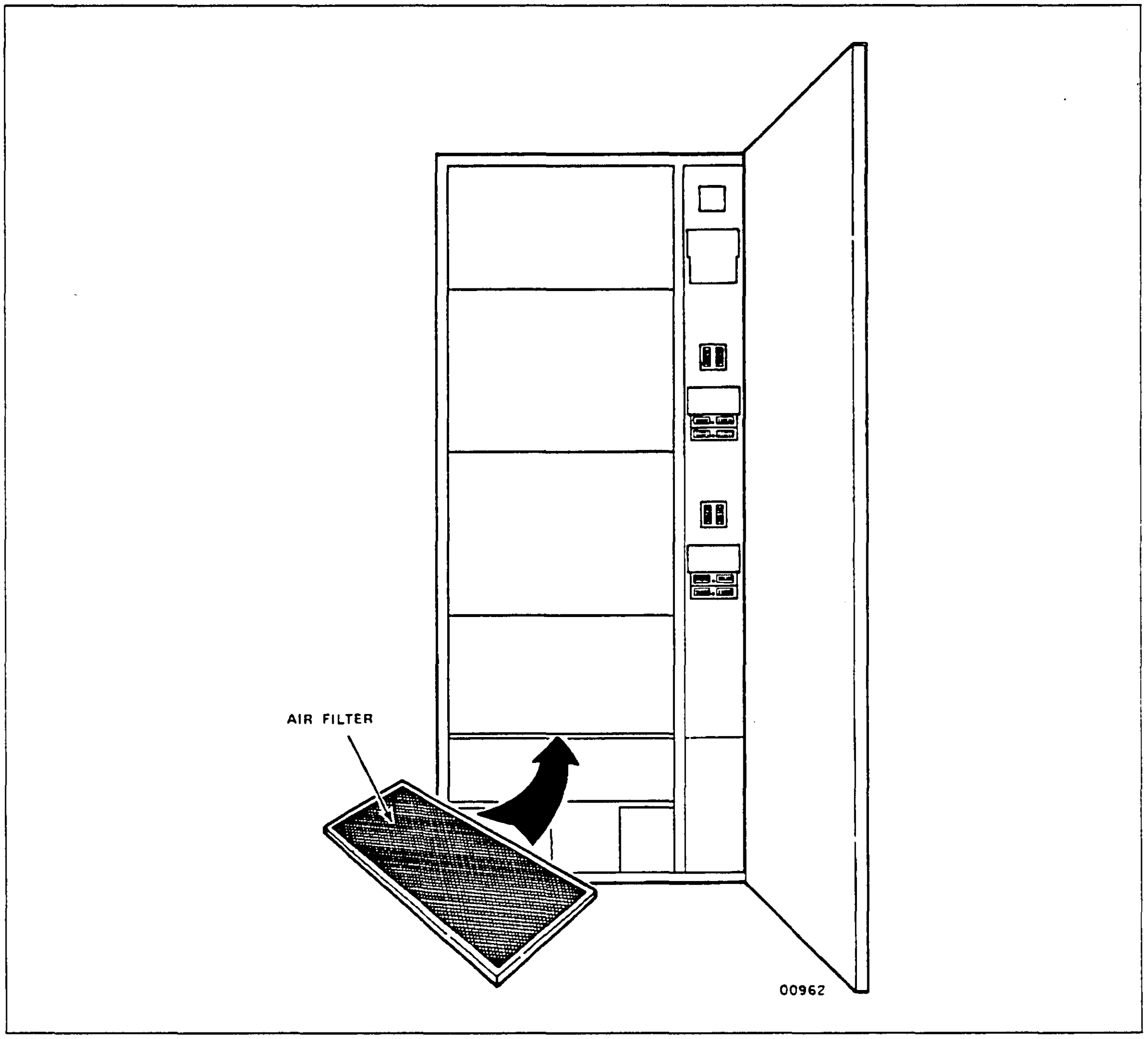

Figure 8-4. Air Filter Location

1. Turn coupler power off (procedure 1).
2. Open rear cabinet door and slide air filter out from its position at base of shroud.
3. Use vacuum cleaner to remove dirt and lint from filter, working from dirty side of filter. If filter still appears dirty after vacuuming, rinse filter in water, shake it, and allow it to dry.
4. Insert air filter in cabinet and close rear cabinet door.

Procedure 5. 50/60-Hz Power Fault Isolation

Perform the following steps to isolate 50/60-Hz power faults.

WARNING

Voltage tests in this procedure involve dangerous voltages. Do not touch exposed voltmeter leads, connector pins, or terminals.

---

1. Refer to figure 8-5. With coupler power on (procedure 1), use ac voltmeter to test for 120 V between pins 1 and 2 of connector J9 at front of power distribution box and then remove power from coupler (procedure 1). If 120 V is absent, go to step 3. Otherwise, refer to figure 8-6 and remove front cover of blower assembly.

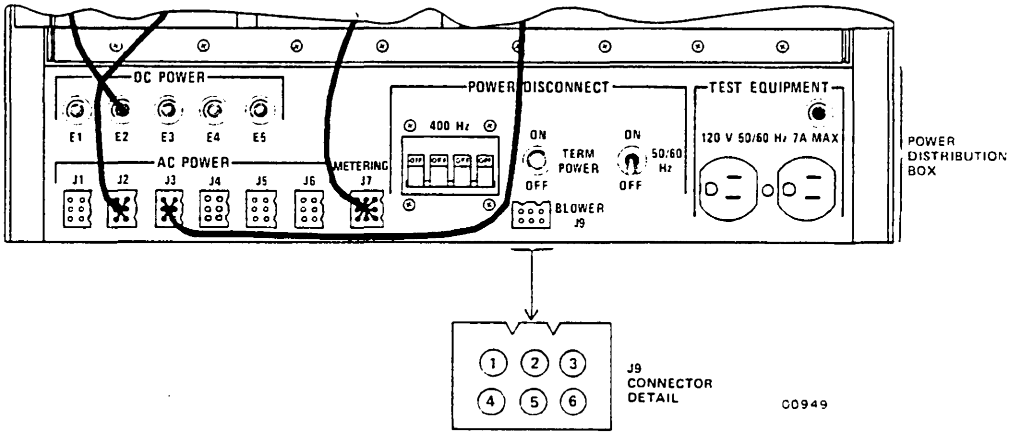

Figure 8-5. Connector J9 Pin Detail

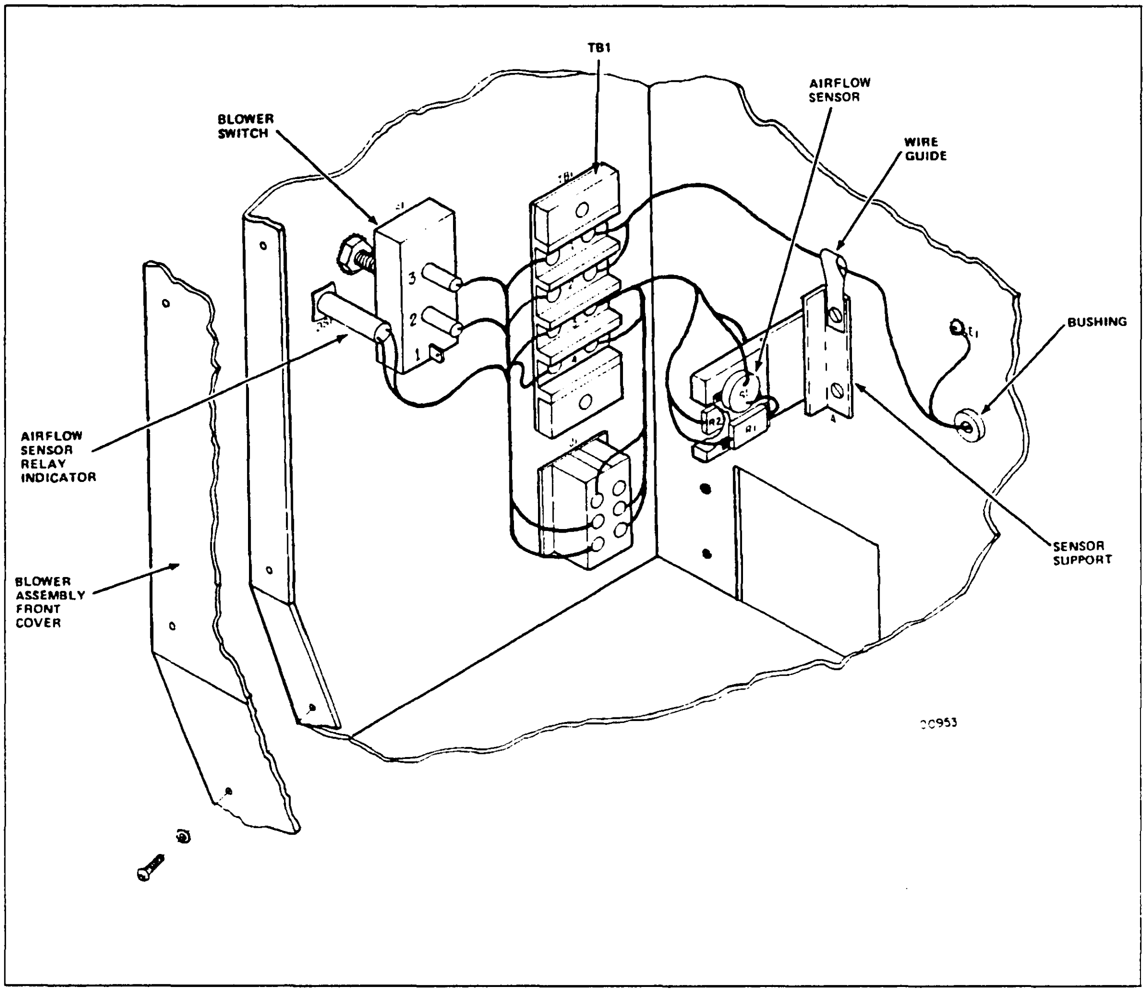

Figure 8-6. Blower Assembly Components

2. Use ohmmeter to test for continuity between terminals 2 and 3 of BLOWER switch (figure 8-6) while switch is in its rest position. If continuity is present, replace blower (procedure 11). Otherwise, replace BLOWER switch (procedure 12).

3. Refer to figure 8-7 and remove rear cover from power distribution box.

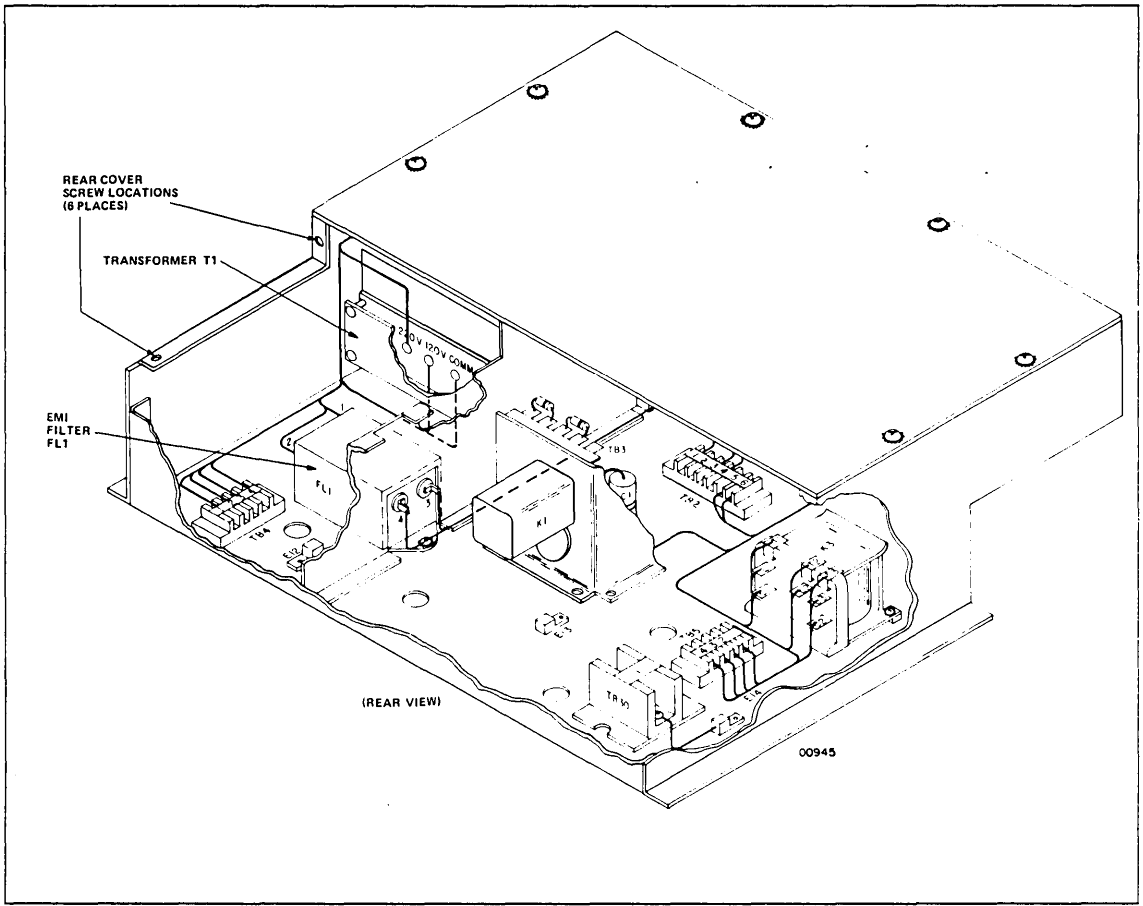

Figure 8-7. Power Distribution Box 50/60-Hz Components

4. Turn 50/60-HZ POWER DISCONNECT switch ON and use ac voltmeter to test for 120 V between terminals 1 and 2 of electromagnetic interference (EMI) filter. If 120 V is present, replace EMI filter (procedure 13). If 120 V is absent and input power is 60 Hz, replace 50/60-HZ POWER DISCONNECT switch (procedure 14). Otherwise, go to step 5.

5. Use ac voltmeter to test for 220 - 250 V between transformer COM terminal and appropriate input voltage terminal on transformer. If 220 - 250 V is present, replace transformer (procedure 15). Otherwise, replace 50/60-HZ POWER DISCONNECT switch (procedure 14).

Procedure 6. 400-Hz Power Fault Isolation

Perform the following steps to isolate 400-Hz power faults.

WARNING

Voltage tests in this procedure involve dangerous voltages. Do not touch exposed voltmeter leads, connector pins, or terminals.

1. Turn coupler power on (procedure 1).
2. Refer to figure 8-2 for location of controls and observe percentage meter while turning METER SELECTOR switch from -5 to +5 position. If meter pointer remains at left side of percentage scale for both voltages, go to step 5. Otherwise, go to step 3.
3. Turn METER SELECTOR switch to -5 position. If it is possible to adjust -5 V DC ADJ control to make meter show 0 percent, go to step 4. Otherwise replace -5 V power supply (procedure 16).
4. Turn METER SELECTOR switch to +5 position. If it is possible to adjust +5 V ADJUST control to make meter show 0 percent, go to step 5. Otherwise, replace +5 V power supply (procedure 16).
5. Refer to figure 8-8 and use ac voltmeter to test for 208 V between following pins of any two unused connectors numbered between J1 and J6 on power distribution box.

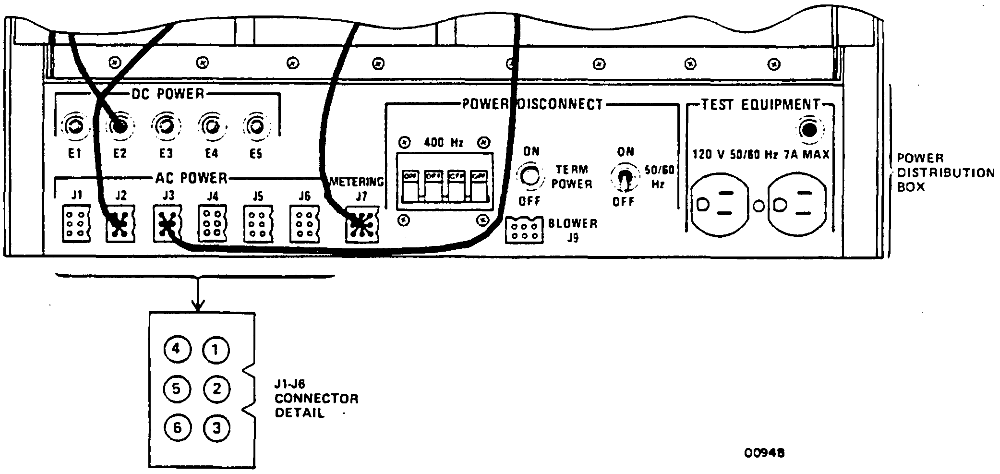

Figure 8-8. Connector Pin Locations

Phase	First Connector Pin	Second Connector Pin
L1/L2	2	3
L1/L3	2	4
L2/L3	3	4

If 208 V is present for all phases, request additional help from technical support group to isolate problem. Otherwise, remove power from coupler (procedure 1) and go to step 6.

6. Refer to figure 8-9 and remove rear cover from power distribution box.

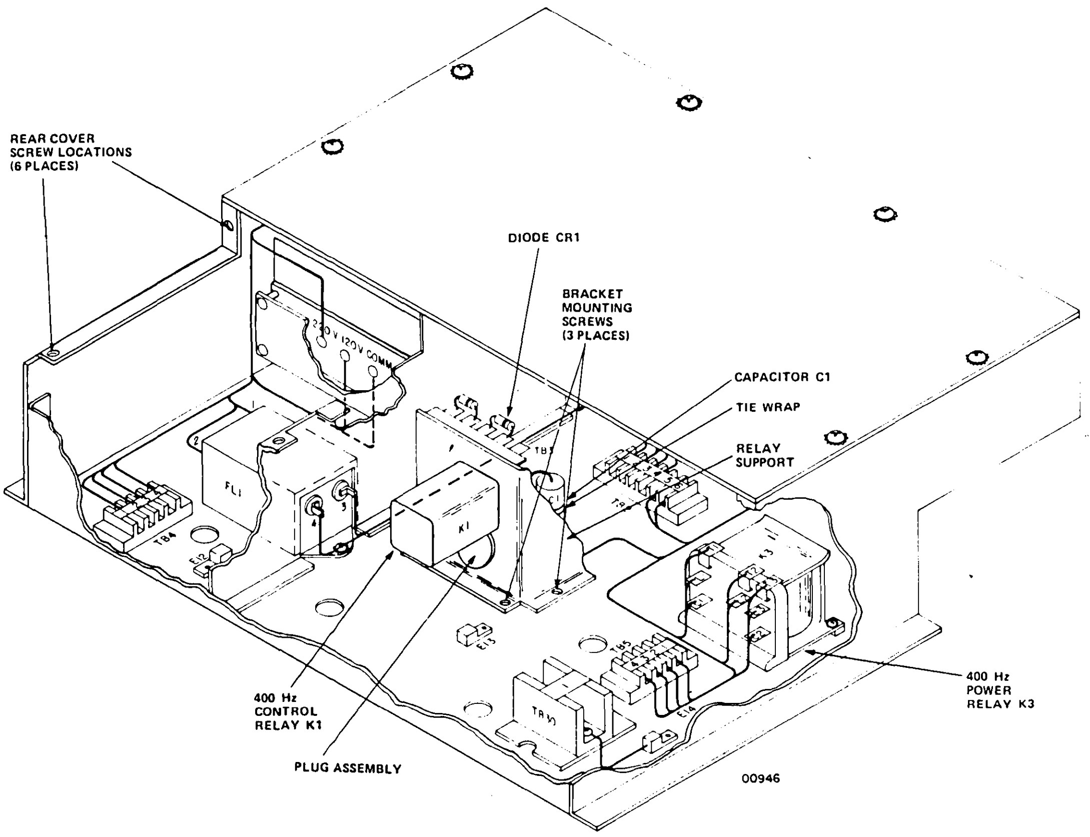

Figure 8-9. Power Distribution Box 400-Hz Components

7. Apply power to coupler (procedure 1). If test in step 5 showed 208 V present for only one or two phases, use ac voltmeter to test for 208 V between the following terminals of 400-Hz power relay.

   L1 and L2
   L1 and L3
   L2 and L3

   If 208 V is present for all phases, replace 400-Hz power relay (procedure 17). Otherwise, replace 400-Hz circuit breaker (procedure 18).

8. Use ac voltmeter to test for 120 V between terminals C1 and C2 of 400-Hz power relay. If 120 V is present, replace 400-Hz power relay (procedure 17). Otherwise, replace 400-Hz control relay (procedure 19). If this does not remedy problem, remove power from coupler (procedure 1), reinstall old 400-Hz control relay, and go to step 9.

9. Refer to figure 8-6. Remove front cover from blower assembly, and use ohmmeter to check for continuity across both terminals of thermal sensor S1. If open, replace S1 (procedure 10). If continuity exists, go to step 10.

10. Refer to figure 8-9 and remove screws holding relay support. Carefully rotate relay support to provide access to diode CR1 and capacitor C1.

11. Use ohmmeter placed on low resistance range to test resistance across diode CR1. Switch ohmmeter leads, and again test resistance across diode. One test should indicate high resistance and the other test should indicate low resistance. If both tests indicate high resistance or if both tests indicate low resistance, replace diode CR1 (procedure 20). Otherwise, replace capacitor C1 (procedure 21).

Procedure 7. POWER-ON Indicator Lamp Replacement

Perform the following steps to replace the POWER ON indicator lamp.

1. Remove power from coupler (procedure 1).
2. Refer to figure 8-10. Squeeze top and bottom of POWER ON lens and pull to release.

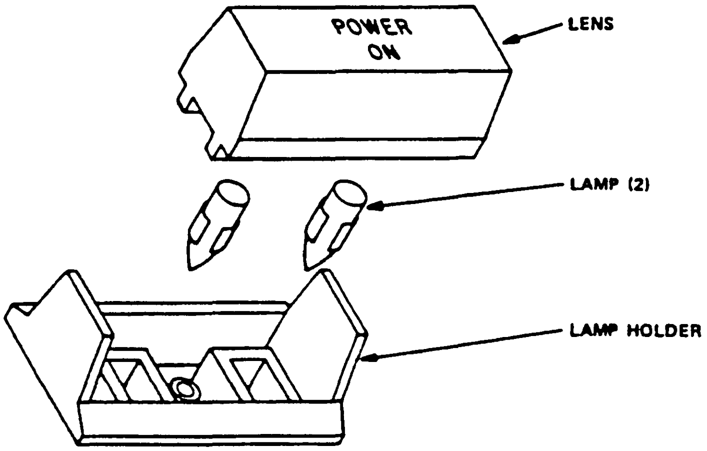

Figure 8-10. POWER ON Indicator Details

3. Remove burned out lamp using long-nose pliers or tweezers.
4. Insert new lamp and replace lens.

Procedure 8. Percentage Meter Replacement

Refer to figure 8-11 and perform the following steps to replace the percentage meter assembly.

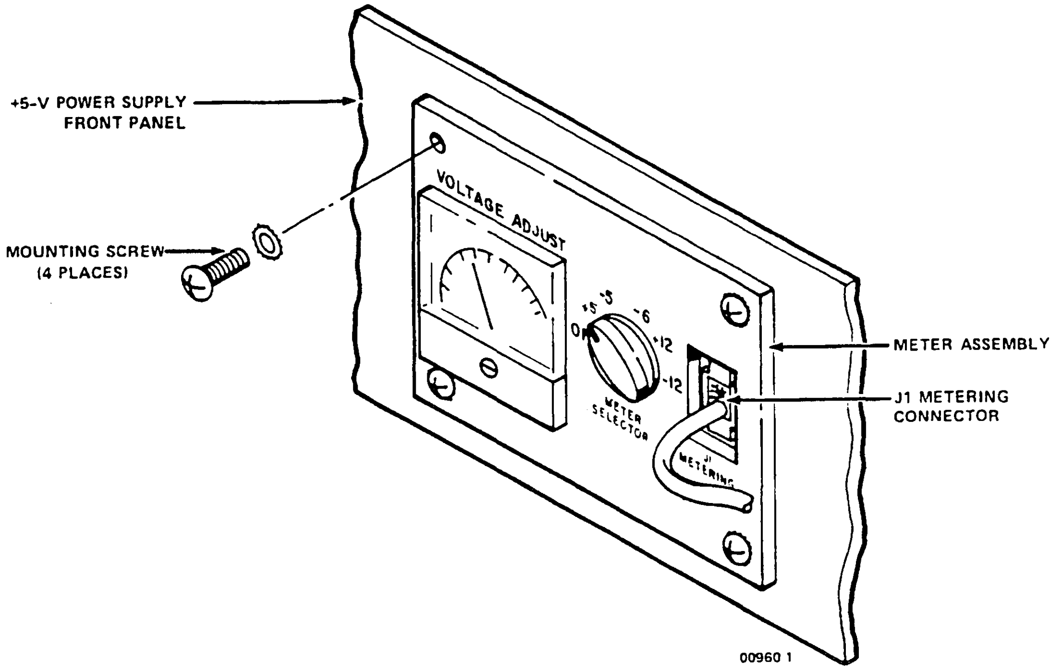

Figure 8-11. Meter Assembly Mounting Details

1. Remove power from coupler (procedure 1).
2. Disconnect interconnecting cable from J1 METERING connector.
3. Remove four screws mounting meter assembly to front panel of +5 V power supply and lift meter assembly free of panel.
4. Connect cable removed in step 2 to J1 METERING connector of new meter assembly.
5. Apply power to coupler (procedure 1).
6. Perform meter calibration (procedure 2).
7. Mount new meter assembly to front panel of +5 V power supply.

Procedure 9. Airflow Sensor Relay Indicator Replacement

To replace the airflow sensor relay indicator, refer to figure 8-12 and perform the following steps.

1. Turn coupler power off (procedure 1).
2. Remove front cover from blower assembly (6 screws).
3. Disconnect indicator wires from terminals TB1-3 and TB1-4.
4. Remove speed nut from sensor indicator, flex blower panel away from metal shield, and remove indicator.
5. Insert new indicator in blower panel and secure indicator with speed nut.
6. Attach spade lugs to indicator wires and connect lugs to terminals TB1-3 and TB1-4.
7. Reinstall blower assembly front cover.

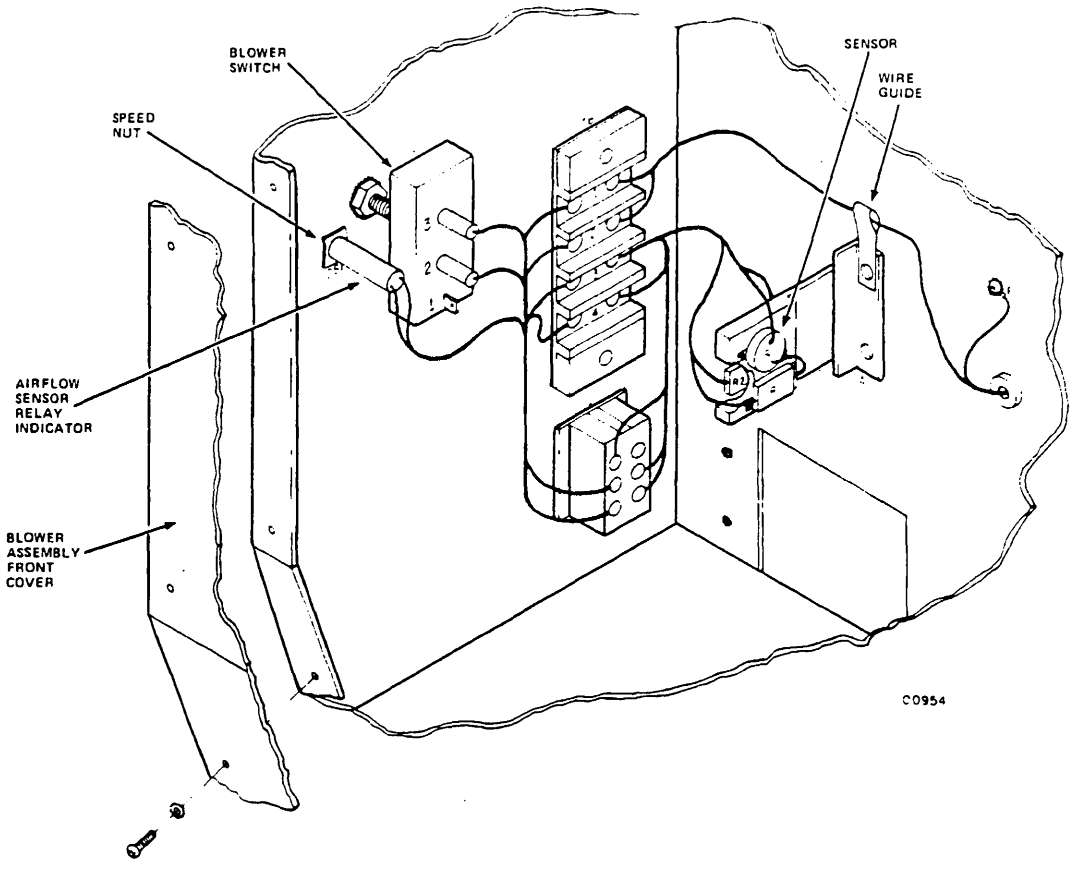

Figure 8-12. Blower Assembly Component Mounting Details

Procedure 10. Airflow Sensor Replacement

To replace the airflow sensor, refer to figure 8-12 and perform the following steps:

1. Turn coupler power off (procedure 1).
2. Remove front cover from blower assembly (figure 8-12).
3. Tag and unsolder or disconnect four wires from airflow sensor.
4. Remove old sensor and install new sensor.
5. Solder/connect wires to new sensor according to tags.
6. Reinstall blower assembly front cover.

Procedure 11. Blower Assembly Replacement

To replace the blower assembly, perform the following steps.

1. Turn coupler power off (procedure 1).
2. Refer to figure 8-12 and remove front cover from blower assembly.
3. Disconnect wires from terminals TB1-1, TB1-2, and E1. Remove black wire and white wire from wire guide.
4. Refer to figure 8-13 and remove shroud from blower assembly.
5. Remove blower from mounting panel.
6. Insert wires from new blower through bushing in mounting panel.
7. Install new blower on mounting panel with hardware removed in step 4.
8. Pass black wire and white wire through wire guide (figure 8-12) and connect blower wires as follows.

Wire	Connection
Green	E1
White	TB1-1
Black	TB1-2

9. Reinstall blower assembly front cover and shroud (figure 8-13).

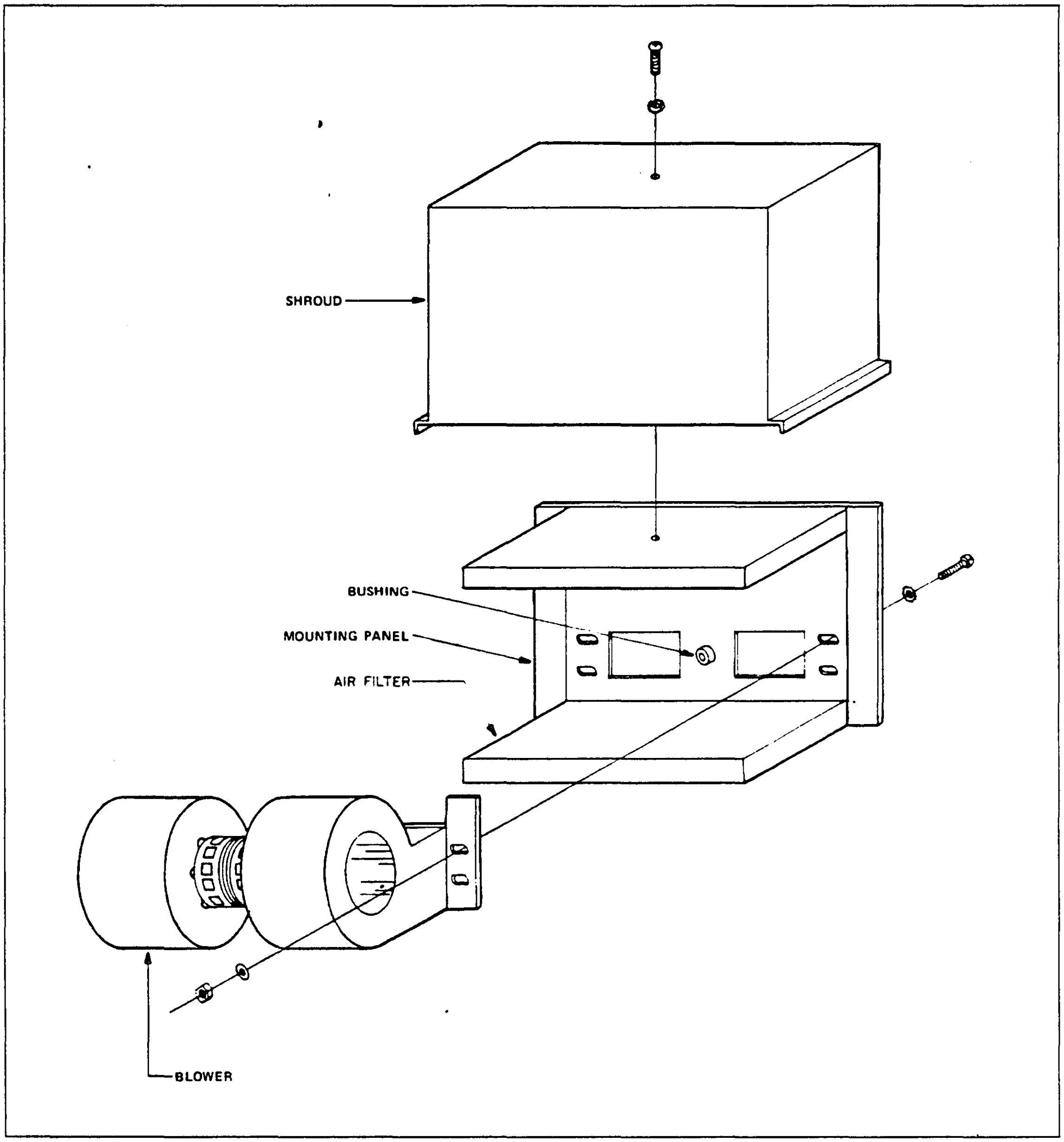

Figure 8-13. Blower, Shroud, and Mounting Panel

Procedure 12. Blower Switch Replacement

To replace the blower switch, refer to figure 8-12 and perform the following steps.

1. Turn coupler power off (procedure 1).
2. Remove front cover from blower assembly (figure 8-12).
3. Tag and unsolder two wires attached to blower switch.
4. Loosen switch hex mounting nut from inside blower panel, remove knurled nut, and remove switch.
5. Place new switch in blower panel with flat side of threads facing up. Secure switch with knurled nut, lockwasher, and hex nut.
6. Solder wires to new switch according to tags.
7. Reinstall blower assembly front cover.

Procedure 13. EMI Filter Replacement

To replace the EMI filter, refer to figure 8-7 and perform the following steps.

1. Turn coupler power off (procedure 1).
2. Remove power distribution box rear cover (figure 8-7).
3. Tag and disconnect four wires attached to EMI filter.
4. Remove EMI filter.
5. Install new EMI filter and connect wires removed in step 3.
6. Reinstall power distribution box rear cover.

Procedure 14. 50/60-Hz POWER DISCONNECT Switch Replacement

To replace the 50/60-HZ POWER DISCONNECT switch, refer to figure 8-14 and perform the following steps.

1. Turn coupler power off (procedure 1) and turn off site wall-mounted 50/60-Hz and 400-Hz circuit breakers feeding coupler. It is suggested that a notice be fastened to these circuit breakers to inform personnel not to turn breakers on.

2. Remove plastic baffle and cabinet-mounted power supplies (procedure 16). Also remove power distribution box front and rear covers (figures 8-14 and 8-9, respectively).

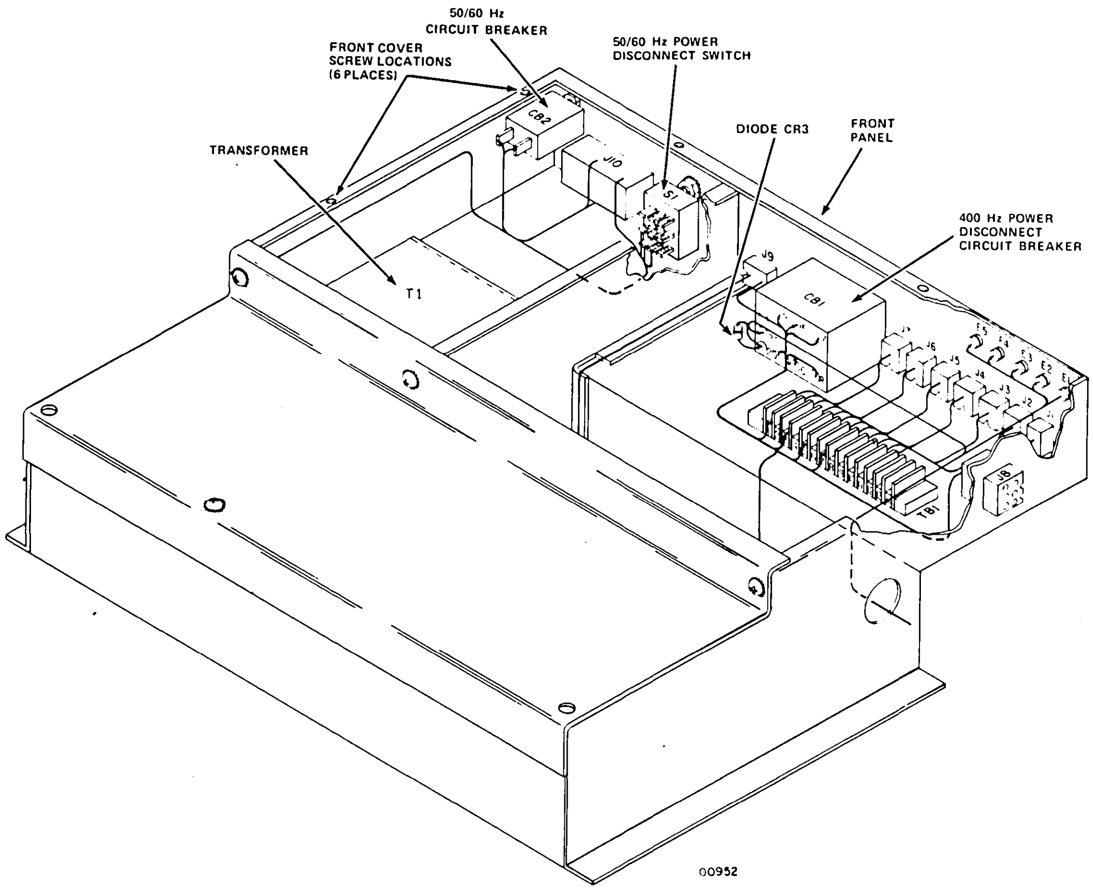
50/60 Hz CIRCUIT BREAKER
FRONT COVER SCREW LOCATIONS (6 PLACES)
50/60 Hz POWER DISCONNECT SWITCH
DIODE CR3
FRONT PANEL
TRANSFORMER
400 Hz POWER DISCONNECT CIRCUIT BREAKER
CB2
J10
S1
J9
T1
CB1
J6
TB1
J8
00952

Figure 8-14. Power Distribution Box Front Components

3. Tag and disconnect six wires attached to 50/60-HZ POWER DISCONNECT switch (figure 8-14).

4. Note mounting position of switch, loosen nut from inside of front panel, remove knurled nut on outside of front panel, and remove switch.

5. Place new switch in front panel in position noted in step 4. Secure new switch with knurled nut, lockwasher, hex nut.
6. Connect wires to new switch according to tags.
7. Reinstall power distribution box front and rear covers, cabinet-mounted power supplies, and plastic baffle.
8. Turn on site wall-mounted 50/60-Hz and 400-Hz circuit breakers feeding coupler.
9. Turn coupler power on (procedure 1).

Procedure 15. Transformer Replacement

To replace the input ac power transformmer, refer to figure 8-14 and perform the following steps.

1. Turn coupler power off (procedure 1) and turn off site wall-mounted 50/60-Hz and 400-Hz circuit breakers feeding coupler. It is suggested that a notice be fastened to these circuit breakers to inform personnel not to turn breakers on.
2. Remove cabinet-mounted power supplies (procedure 16).
3. Remove plastic baffle and power distribution box front and rear covers (figures 8-14 and 8-9, respectively).
4. Remove EMI filter (procedure 13).
5. Tag and disconnect five wires attached to transformer (figure 8-14).
6. Remove fasteners that attach transformer and support to power distribution box. Lift transformer and support from power distribution box.
7. Detach transformer from support.
8. Attach new transformer to support. Install transformer and support in power distribution box.
9. Connect wires to new transformer according to tags.
10. Reinstall EMI filter (procedure 13), power distribution box front and rear covers (figures 8-14 and 8-9, respectively), and cabinet-mounted power supplies (procedure 16), and plastic baffle.
11. Turn on site wall-mounted 50/60-Hz and 400-Hz circuit breakers feeding coupler.
12. Turn coupler power on (procedure 1).

Procedure 16. Power Supply Replacement

Perform the following steps to replace either the −5 V power supply or +5 V power supply as applicable. Refer to figure 8-2 for power supply details.

NOTE

Power supply replacement requires two people.

-5 V Power Supply

1. Turn coupler power off (procedure 1).
2. Refer to figure 8-2. Remove power cables from terminal E1 and AC INPUT connector, and ground strap from terminal E2 at front of power supply.
3. Remove screws that attach power supply to front mounting brackets of cabinet. Slide power supply out rear of cabinet.
4. Install a replacement −5 V power supply by reversing the preceding steps.
5. Apply power to coupler (procedure 1) and adjust both −5 V DC ADJ and +5 V ADJUST controls until voltage percentage meter shows 0 percent for each adjustment.

+5 V Power Supply

1. Turn coupler power off (procedure 1).
2. Refer to figure 8-2. Remove cables from J1 METERING, J1 AC INPUT, and J2 connectors at front of +5 V power supply.
3. Remove rear cover from power supply.
4. Remove ground and power cables from terminals E3 and E4 at back of power supply.
5. Remove four screws that attach power supply to mounting brackets at front of cabinet. Slide power supply out front of cabinet.
6. Install a replacement +5 V power supply by reversing the preceding steps.
7. Apply power to coupler (procedure 1) and adjust both −5 V DC ADJ and +5 V ADJUST controls until voltage percentage meter shows 0 percent for each adjustment.

Procedure 17. 400-Hz Power Relay Replacement

To replace the 400-Hz power relay (K3) in the power distribution box, refer to figure 8-9 and perform the following steps.

1. Turn coupler power off (procedure 1) and turn off site wall-mounted 50/60-Hz and 400-Hz circuit breakers feeding coupler. It is suggested that a notice be fastened to these circuit breakers to inform personnel not to turn breakers on.
2. Remove cabinet-mounted power supplies (procedure 16).
3. Remove plastic baffle and power distribution box rear cover (figure 8-9).
4. Tag and disconnect eight wires attached to 400-Hz power relay.
5. Remove power relay and install new relay.
6. Connect wires to new relay according to tags.
7. Reinstall power distribution box front and rear covers, cabinet-mounted power supplies (procedure 16), and plastic baffle.
8. Turn on wall-mounted 50/60-Hz and 400-Hz circuit breakers feeding coupler and apply power to coupler (procedure 1).

Procedure 18. 400-Hz Circuit Breaker Replacement

To replace the 400-Hz circuit breaker in the power distribution box, refer to figure 8-14 and perform the following steps.

1. Turn coupler power off (procedure 1) and turn off site wall-mounted 50/60-Hz and 400-Hz circuit breakers feeding coupler. It is suggested that a notice be fastened to these circuit breakers to inform personnel not to turn breakers on.
2. Remove cabinet-mounted power supplies (procedure 16).
3. Remove plastic baffle and power distribution box front cover (figure 8-14).
4. Tag and disconnect eight wires attached to 400-HZ POWER DISCONNECT circuit breaker.
5. Remove circuit breaker.
6. Transfer diode CR3 from old circuit breaker to new one; maintain same diode polarity.
7. Install new circuit breaker.
8. Connect wires to new circuit breaker according to tags.
9. Reinstall power distribution box front and rear covers, cabinet-mounted power supplies (procedure 16), and plastic baffle.
10. Turn on wall-mounted 50/60-Hz and 400-Hz circuit breakers feeding coupler and apply power to coupler (procedure 1).

Procedure 19. 400-Hz Control Relay Replacement

To replace the 400-Hz control relay (K1) in the power distribution box, refer to figure 8-9 and perform the following steps.

1. Turn coupler power off (procedure 1) and turn off site wall-mounted 50/60-Hz and 400-Hz circuit breakers feeding coupler. It is suggested that a notice be fastened to these circuit breakers to inform personnel not to turn breakers on.
2. Remove cabinet-mounted power supplies (procedure 16).
3. Remove power distribution box rear cover (figure 8-9).
4. Remove 400-Hz control relay from socket K1, and insert new relay.
5. Reinstall cabinet-mounted power supplies and power distribution box rear cover.
6. Turn on wall-mounted 50/60-Hz and 400-Hz circuit breakers feeding coupler and apply power to coupler (procedure 1).

Procedure 20. Diode CR1 Replacement

To replace diode CR1 in the power distribution box, refer to figure 8-9 and perform the following steps.

1. Turn coupler power off (procedure 1) and turn off site wall-mounted 50/60-Hz and 400-Hz circuit breakers feeding coupler. It is suggested that a notice be fastened to these circuit breakers to inform personnel not to turn breakers on.
2. Remove cabinet-mounted power supplies (procedure 16).
3. Remove power distribution box rear cover (figure 8-9).
4. Remove screws mounting relay support bracket and rotate bracket to gain access to diode CR1.
5. Unsolder diode CR1 leads connected to TB3-2 and TB3-3.
6. Place 12 mm (0.5 in) of sleeve insulation on each lead of new diode and trim leads to appropriate length.
7. Solder negative (band) lead of new diode to TB3-3 and other lead to TB3-2.
8. Mount relay support bracket to power distribution box.
9. Install cabinet-mounted power supplies and power distribution box rear cover.
10. Turn on wall-mounted 50/60-Hz and 400-Hz circuit breakers feeding coupler and apply power to coupler (procedure 1).

Procedure 21. Capacitor C1 Replacement

To replace capacitor C1 in the power distribution box, refer to figure 8-9 and perform the following steps.

1. Turn coupler power off (procedure 1) and turn off site wall-mounted 50/60-Hz and 400-Hz circuit breakers feeding coupler. It is suggested that a notice be fastened to these circuit breakers to inform personnel not to turn breakers on.
2. Remove cabinet-mounted power supplies (procedure 16).
3. Remove power distribution box rear cover (figure 8-9).
4. Remove screws mounting relay support bracket and rotate bracket to gain access to capacitor C1.
5. Unsolder capacitor leads connected to relay socket terminals K1-1 and K1-7.
6. Cut tie wrap and remove capacitor C1 from relay support.
7. Attach new capacitor to relay support with tie wrap.
8. Place sleeve insulation on each lead of new capacitor and trim lead to appropriate length.
9. Solder negative lead of capacitor to K1-1 and positive lead to K1-7.
10. Mount relay support bracket to power distribution box.
11. Install cabinet-mounted power supplies and power distribution box rear cover.
12. Turn on wall-mounted 50/60-Hz and 400-Hz circuit breakers feeding coupler and apply power to coupler (procedure 1).

Procedure 22. FIPS Device Interface Connector Pin Extraction

To remove pins from the FIPS device I/O connectors, use a CDC part number 86732402 extractor tool and perform the following steps.

1. Move handle of extractor tool to back end of tool.
2. Approach from front side of connector block and insert front end of extractor tool between the two prongs of connector pin.
3. Slide handle toward front of extractor tool to release connector pin catch from connector.
4. Remove pin through back side of connector block.
5. Install a replacement connector pin (CDC part number 94355103) into back side of connector by hand.

Procedure 23. Logic Card Replacement

To replace logic cards in the coupler logic rack, perform the following steps.

1. Turn 400-HZ POWER DISCONNECT circuit breaker OFF (procedure 1).
2. Squeeze retaining fasteners on metal cover plate at front of logic chassis and swing cover plate down to access logic cards.
3. Rotate upper and lower card cams simultaneously to disconnect card from backpanel connector.
4. Slide card out of logic rack.
5. Install replacement card in logic rack card slots with component side of board facing right.
6. Position card cams into cam grooves and rotate cams simultaneously to seat card into backpanel connector.
7. Turn 400-HZ POWER DISCONNECT circuit breaker ON.

Parts Data 9

Spare Parts List 9-1

Parts Data 9

Spare Parts List

This list contains the recommended replaceable electrical parts for the CYBER channel coupler.

PROD FR205-B PROD P/N 22118281 DESC (RISK) FR205-B, CYB CHAN CPLR

PART NUMBER	DESCRIPTION
19191600	I/O COAXIAL CABLE ASSY
18752831	CONNECTOR, COAXIAL MULTIPLE POS
18874300	MARKER, IDENT-CABLE STRAP
24567000	CABLE, COAXIAL 19 COND., 73OHM
10284351	MOD ASSY-CYBER 2K UDI
10284352	MOD ASSY-FIPS UDI 2K
22137381	MOD ASSY-CYBER STATUS CLOCKS
10285797	PCB ASSY-MAINT CR
10284353	(RISK) PCB ASSY-MEMORY CR
10283690	MOD ASSY FIPS 4
22179490	PC BD ASSY-CY DATA BUS I/F
23140103	PRINTED CKT BD ASSY-CYB CH I/F
22647109	WIRE ELEC TP 30GA KYNAR BLK/WT
10292489	MOD ASSY PROCESSOR CONTROL
53590866	PRINTED CKT BD ASSY-FIP #3
53595819	MOD ASSY PROCESSOR ALU
94380204	INDICATOR-ILLUMINATED PANEL
94380400	LAMP-INCANDESCENT, MINIATURE
94380800	LENS-LETTERED
00815469	FILTER WASHABLE
00816700	BLOWER 523 C.F.M.
24571702	SWITCH TOGGLE TWO POSITION SP
51713900	LIGHT, NEON INDICATOR 1/3 WATT
53915602	AIR FLOW SENSOR ASSY
51808104	SWITCH THERMAL 120 VAC 130 F
18287502	DIODE, SILICON DIFFUSED JUNCTIO
18440702	CKT BREAKER 4 POLE AUX SWITCH
18565200	RELAY, 25AMP(3P SINGLE THROW)
18890003	CAP FXD ALUM 40VDC 750 UF
24550802	RELAY, OCTAL SOCKET
53973800	TRANSFORMER STEP DOWN .75KVA
96744777	FILTER-RFI LOW LEAKAGE
97022400	SWITCH-TOGGLE, 3PDT
67310400	PWR SUPPLY ASSY MASTER 5V 100A
51731101	CIRCUIT BREAKER 2 AMP
67310600	POWER SUPPLY ASSY 5V 10AMP

PROD FV720-B   PROD P/N 22118282   DESC (RISK) FV720-B, CCC OPTION

PART NUMBER	DESCRIPTION
18752831	CONNECTOR, COAXIAL MULTIPLE POS
18874300	MARKER, IDENT-CABLE STRAP
24567000	CABLE, COAXIAL 19 COND., 730 HM
22137381	MOD ASSY-CYBER STATUS CLOCKS
10284353	(RISK) PCB ASSY-MEMORY CR
✓10283690	MOD ASSY FIPS 4
22179490	PC BD ASSY-CY DATA BUS I/F
23140103	PRINTED CKT BD ASSY-CYB CH I/F
22647109	WIRE ELECT TP 30GA KYNAR BLK/WT
10292489	MOD ASSY PROCESSOR CONTROL
✓53590866	PRINTED CKT BD ASSY-FIPS #3
53595819	MOD ASSY PROCESSOR ALU

Wire Lists

10

Wire Lists 10

This section contains the logic chassis wire list or cross tabs for the backpanel, and contains cable tab listings for the I/O cables. The cross tabs show the physical backpanel wiring destinations for each logic module pin. The cable tabs list the cable connections between the backpanel and the FIPS device and CYBER channel I/O connectors.

```
PAGE     1 PACK       A01                                                                                     DATE 87/05/22.
     ORIGIN        LEVS      DESTINATION    LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A01-1A03/1C03  11         A04-2B03/2D03  11     8  A04B53               A
     A01-1A04/1C04  11         A03-1B04/1D04  11     4  A04B72               A
     A01-1A07/1C07  11         A04-1A04/1C04  11    13  A04A04               A
     A01-1A14/1C14  11         A04-2A08/2C08  11     8  A01A14               A
     A01-1A19/1C19  11         A04-2B17/2D17  11     8  A04B67               A
     A01-1A20/1C20  11         A04-1A36/1C36  11     5  A01A20               A
     A01-1A22/1C22  11         A04-1A33/1C33  11     5  A04A33               A
     A01-1A29/1C29  11         A04-2A05/2C05  11     6  A01A29               A
     A01-1A35/1C35  11         A04-1A34/1C34  11     4  A02A74               A
     A01-1A37/1C37  11         A02-1A37/1C37  11     3  A01A37               A
     A01-1A38/1C38  11         A02-1A38/1C38  11     3  A01A38               A
     A01-1A40/1C40  11         A02-1A40/1C40  11     3  A01A40               A
     A01-1A41/1C41  11         A02-1A41/1C41  11     3  A01A41               A
     A01-1A42/1C42  11         A02-1A42/1C42  11     3  A01A42               A
     A01-1A43/1C43  11         A02-1A43/1C43  11     3  A01A43               A
     A01-1B03/1D03  11         A04-1B43/1D43  11     7  A01B03               A
     A01-1B04/1D04  11         A04-1A41/1C41  11     7  A01B04               A
     A01-1B14/1D14  11         A04-2A07/2C07  11     8  A01B14               A
     A01-1B15/1D15  11         A02-2A42/2C42  11    11  A01B15               A
     A01-1B19/1D19  11         A02-2B30/2D30  11     9  A01B19               A
     A01-1B22/1D22  11         A04-2B16/2D16  11     8  A04B66               A
     A01-1B29/1D29  11         A02-2A41/2C41  11     9  A01B29               A
     A01-1B30/1D30  11         A02-2B32/2D32  11     8  A01B30               A
     A01-1B37/1D37  11         A02-1B37/1D37  11     3  A01B37               A
     A01-1B38/1D38  11         A02-1B38/1D38  11     3  A01B38               A
     A01-1B40/1D40  11         A02-1B40/1D40  11     3  A01B40               A
     A01-1B41/1D41  11         A02-1B41/1D41  11     3  A01B41               A
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PAGE     2  PACK        A01                                                                                      DATE 87/05/22.
     ORIGIN        LEVS      DESTINATION     LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A01-1B42/1D42  11        A02-1B42/1D42  11     3   A01B42                A
     A01-1B43/1D43  11        A02-1B43/1D43  11     3   A01B43                A
     A01-2A04/2C04  11        A04-2B10/2D10  11     5   A04B60                A
     A01-2A09/2C09  11        A04-2A27/2C27  11     5   A01A59                A
     A01-2A15/----            A01-2C15/----             GRNDXX                A
     A01-2A19/----            A01-2C19/----             GRNDXX                A
     A01-2A27/----            A01-2C27/----             GRNDXX                A
     A01-2A31/----            A01-2C31/----             GRNDXX                A
     A01-2A35/----            A01-2C35/----             GRNDXX                A
     A01-2A43/----            A01-2C43/----             GRNDXX                A
     A01-2B04/2D04  11        A02-2A36/2C36  11     6   A01B54                A
     A01-2B09/2D09  11        A02-2A38/2C38  11     5   A04A74                A
     A01-2B10/2D10  11        A04-2B25/2D25  11     5   A04B75                A
     A01-2B13/2D13  11        A04-2A21/2C21  11     4   A01B63                A
     A01-2B14/2D14  11        A03-2A26/2C26  11     4   A03A76                A
     A01-2B15/----            A01-2D15/----             GRNDXX                A
     A01-2B19/----            A01-2D19/----             GRNDXX                A
     A01-2B27/----            A01-2D27/----             GRNDXX                A
     A01-2B31/----            A01-2D31/----             GRNDXX                A
     A01-2B35/----            A01-2D35/----             GRNDXX                A
     A01-2B43/----            A01-2D43/----             GRNDXX                A
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PAGE     3  PACK       A02                                                                                      DATE 87/05/22.
     ORIGIN         LEVS      DESTINATION     LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A02-1A03/1C03  11         A04-1A03/1C03  11    13    A04A03                A
     A02-1A04/1C04  11         A04-2B09/2D09  11    13    A04B59                A
     A02-1A05/1C05  11         A04-1A05/1C05  11    13    A04A05                A
     A02-1A08*1C08  11         A04-1A08/1C08  11     4    A04A08                A
     A02-1A09*1C09  11         A04-1A09/1C09  11     4    A04A09                A
     A02-1A10*1C10  11         A04-1A10/1C10  11     4    A04A10                A
     A02-1A11*1C11  11         A04-1A11/1C11  11     4    A04A11                A
     A02-1A12*1C12  11         A04-1A12/1C12  11     4    A04A12                A
     A02-1A13*1C13  11         A04-1A13/1C13  11     4    A04A13                A
     A02-1A14*1C14  11         A04-1A14/1C14  11     4    A04A14                A
     A02-1A15*1C15  11         A04-1A15/1C15  11     4    A04A15                A
     A02-1A16*1C16  11         A04-1A16/1C16  11     4    A04A16                A
     A02-1A19/1C19  11         A04-1B42/1D42  11     5    A02A19                A
     A02-1A20/1C20  11         A08-2A32/2C32  11    10    A08A82                A
     A02-1A21/1C21  11         A04-2A14/2C14  11     8    A04A64                A
     A02-1A24/1C24  11         A03-1A24/1C24  11     3    A03A24                A
     A02-1A25/1C25  11         A03-1A25/1C25  11     3    A03A25                A
     A02-1A26/1C26  11         A03-1A26/1C26  11     3    A03A26                A
     A02-1A27/1C27  11         A03-1A27/1C27  11     3    A03A27                A
     A02-1A28/1C28  11         A03-1A28/1C28  11     3    A03A28                A
     A02-1A29/1C29  11         A03-1A29/1C29  11     3    A03A29                A
     A02-1A30/1C30  11         A03-1A30/1C30  11     3    A03A30                A
     A02-1A31/1C31  11         A03-1A31/1C31  11     3    A03A31                A
     A02-1A35/1C35  11         A04-2B07/2D07  11     6    A04B57                A
     A02-1A37/1C37  11         A01-1A37/1C37  11     3    A01A37                A
     A02-1A38/1C38  11         A01-1A38/1C38  11     3    A01A38                A
     A02-1A40/1C40  11         A01-1A40/1C40  11     3    A01A40                A
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PAGE     4  PACK        A02                                                                                      DATE 87/05/22.
     ORIGIN          LEVS       DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A02-1A41/1C41   11         A01-1A41/1C41    11      3   A01A41                A
     A02-1A42/1C42   11         A01-1A42/1C42    11      3   A01A42                A
     A02-1A43/1C43   11         A01-1A43/1C43    11      3   A01A43                A
     A02-1B03/1D03   11         A04-1B03/1D03    11     13   A04B03                A
     A02-1B08*1D08   11         A04-1B08/1D08    11      4   A04B08                A
     A02-1B09*1D09   11         A04-1B09/1D09    11      4   A04B09                A
     A02-1B10*1D10   11         A04-1B10/1D10    11      4   A04B10                A
     A02-1B11*1D11   11         A04-1B11/1D11    11      4   A04B11                A
     A02-1B12*1D12   11         A04-1B12/1D12    11      4   A04B12                A
     A02-1B13*1D13   11         A04-1B13/1D13    11      4   A04B13                A
     A02-1B14*1D14   11         A04-1B14/1D14    11      4   A04B14                A
     A02-1B15*1D15   11         A04-1B15/1D15    11      4   A04B15                A
     A02-1B16*1D16   11         A04-1B16/1D16    11      4   A04B16                A
     A02-1B24/1D24   11         A03-1B24/1D24    11      3   A03B24                A
     A02-1B25/1D25   11         A03-1B25/1D25    11      3   A03B25                A
     A02-1B26/1D26   11         A03-1B26/1D26    11      3   A03B26                A
     A02-1B27/1D27   11         A03-1B27/1D27    11      3   A03B27                A
     A02-1B28/1D28   11         A03-1B28/1D28    11      3   A03B28                A
     A02-1B29/1D29   11         A03-1B29/1D29    11      3   A03B29                A
     A02-1B30/1D30   11         A03-1B30/1D30    11      3   A03B30                A
     A02-1B31/1D31   11         A03-1B31/1D31    11      3   A03B31                A
     A02-1B36/1D36   11         A08-2A17/2C17    11      8   A02B36                A
     A02-1B37/1D37   11         A01-1B37/1D37    11      3   A01B37                A
     A02-1B38/1D38   11         A01-1B38/1D38    11      3   A01B38                A
     A02-1B40/1D40   11         A01-1B40/1D40    11      3   A01B40                A
     A02-1B41/1D41   11         A01-1B41/1D41    11      3   A01B41                A
     A02-1B42/1D42   11         A01-1B42/1D42    11      3   A01B42                A
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PAGE     5  PACK        A02                                                                                DATE 87/05/22.
      ORIGIN          LEVS        DESTINATION      LEVS  LTH    SIGNAL   CBL  COLORS  REV   GA  TYPE ---------- DESCRIPTION ----------- QSE

      A02-1B43/1D43    11           A01-1B43/1D43   11     3    A01B43                  A

      A02-2A03/2C03    11           A03-2B20/2D20   11     4    A03B70                  A

      A02-2A07/2C07    11           A03-2A07/2C07   11     3    A03A57                  A

      A02-2A08/2C08    11           A03-2A08/2C08   11     3    A03A58                  A

      A02-2A09/2C09    11           A03-2A09/2C09   11     3    A03A59                  A

      A02-2A10/2C10    11           A03-2A10/2C10   11     3    A03A60                  A

      A02-2A11/2C11    11           A03-2A11/2C11   11     3    A03A61                  A

      A02-2A12/2C12    11           A03-2A12/2C12   11     3    A03A62                  A

      A02-2A13/2C13    11           A03-2A13/2C13   11     3    A03A63                  A

      A02-2A14/2C14    11           A03-2A14/2C14   11     3    A03A64                  A

      A02-2A20/2C20    11           A04-2A26/2C26   11     4    A02A70                  A

      A02-2A21/2C21    11           A09-2B19/2D19   11     7    A09B69                  A

      A02-2A22/2C22    11           A04-1A43/1C43   11     6    A04A43                  A

      A02-2A24/2C24    22           A04-1A34/1C34   22     7    A02A74                  A

      A02-2A25/2C25    11           A04-2A03/2C03   11     5    A04A53                  A

      A02-2A26/2C26    11           A03-2B34/2D34   11     4    A03B84                  A

      A02-2A34*2C34    11           A04-2A34/2C34   11     4    A04A84                  A

      A02-2A36/2C36    11           A01-2B04/2D04   11     6    A01B54                  A

      A02-2A37/2C37    11           A04-2A20/2C20   11     5    A04A70                  A

      A02-2A38/2C38    11           A01-2B09/2D09   11     5    A04A74                  A
      A02-2A38/2C38    22           A04-2A24/2C24   22     4    A04A74                  A

      A02-2A40/2C40    11           A04-2A15/2C15   11     5    A04A65                  A

      A02-2A41/2C41    11           A01-1B29/1D29   11     9    A01B29                  A
      A02-2A41/2C41    22           A04-1B35/1D35   22     9    A01B29                  A

      A02-2A42/2C42    11           A01-1B15/1D15   11    11    A01B15                  A

      A02-2A43/2C43    11           A03-2A25/2C25   11     4    A03A75                  A

      A02-2B04/2D04    11           A03-1B35/1D35   11     5    A03B35                  A

      A02-2B07/2D07    11           A03-2B07/2D07   11     3    A03B57                  A
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PAGE     6  PACK        A02                                                                                                      DATE 87/05/22.
     ORIGIN         LEVS       DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A02-2B08/2D08   11          A03-2B08/2D08   11     3   A03B58                 A
     A02-2B09/2D09   11          A03-2B09/2D09   11     3   A03B59                 A
     A02-2B10/2D10   11          A03-2B10/2D10   11     3   A03B60                 A
     A02-2B11/2D11   11          A03-2B11/2D11   11     3   A03B61                 A
     A02-2B12/2D12   11          A03-2B12/2D12   11     3   A03B62                 A
     A02-2B13/2D13   11          A03-2B13/2D13   11     3   A03B63                 A
     A02-2B14/2D14   11          A03-2B14/2D14   11     3   A03B64                 A
     A02-2B15/2D15   11          A03-1A35/1C35   11     6   A03A35                 A
     A02-2B16/2D16   11          A04-1B36/1D36   11     6   A02B66                 A
     A02-2B17/2D17   11          A04-2B18/2D18   11     4   A04B68                 A
     A02-2B18/2D18   11          A03-2A22/2C22   11     3   A03A72                 A
     A02-2B19/2D19   11          A08-1B37/1D37   11     8   A08B37                 A
     A02-2B27/2D27   11          A04-2A04/2C04   11     5   A02B77                 A
     A02-2B28/2D28   11          A04-2B15/2D15   11     4   A08B54                 A
     A02-2B29/2D29   11          A04-2B04/2D04   11     5   A02B79                 A
     A02-2B30/2D30   11          A01-1B19/1D19   11     9   A01B19                 A
     A02-2B31/2D31   11          A03-2B21/2D21   11     4   A03B71                 A
     A02-2B32/2D32   11          A01-1B30/1D30   11     8   A01B30                 A
     A02-2B32/2D32   22          A04-2B05/2D05   22     5   A01B30                 A
     A02-2B33*2D33   11          A04-2B33/2D33   11     4   A04B83                 A
     A02-2B34*2D34   11          A04-2B34/2D34   11     4   A04B84                 A
     A02-2B35/2D35   22          A04-2A05/2C05   22     6   A01A29                 A
     A02-2B42/2D42   22          A04-1A36/1C36   22     9   A01A20                 A
     A02-2B43/2D43   11          A04-1A35/1C35   11     9   A02B93                 A
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PAGE      7  PACK        A03                                                                                DATE 87/05/22.
     ORIGIN         LEVS       DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A03-1A12/1C12   11          A04-1A40/1C40   11     5    A04A40                A
     
     A03-1A13/1C13   11          A03-1B34/1D34   11     5    A03B34                A

     A03-1A24/1C24   11          A02-1A24/1C24   11     3    A03A24                A
     A03-1A24/1C24   22          A04-1A24/1C24   22     3    A03A24                A

     A03-1A25/1C25   11          A02-1A25/1C25   11     3    A03A25                A
     A03-1A25/1C25   22          A04-1A25/1C25   22     3    A03A25                A

     A03-1A26/1C26   11          A02-1A26/1C26   11     3    A03A26                A
     A03-1A26/1C26   22          A04-1A26/1C26   22     3    A03A26                A

     A03-1A27/1C27   11          A02-1A27/1C27   11     3    A03A27                A
     A03-1A27/1C27   22          A04-1A27/1C27   22     3    A03A27                A

     A03-1A28/1C28   11          A02-1A28/1C28   11     3    A03A28                A
     A03-1A28/1C28   22          A04-1A28/1C28   22     3    A03A28                A

     A03-1A29/1C29   11          A02-1A29/1C29   11     3    A03A29                A
     A03-1A29/1C29   22          A04-1A29/1C29   22     3    A03A29                A

     A03-1A30/1C30   11          A02-1A30/1C30   11     3    A03A30                A
     A03-1A30/1C30   22          A04-1A30/1C30   22     3    A03A30                A

     A03-1A31/1C31   11          A02-1A31/1C31   11     3    A03A31                A
     A03-1A31/1C31   22          A04-1A31/1C31   22     3    A03A31                A

     A03-1A32/1C32   11          A04-2B29/2D29   11     8    A04B79                A

     A03-1A34/1C34   11          A04-1B22/1D22   11     4    A03A34                A

     A03-1A35/1C35   11          A02-2B15/2D15   11     6    A03A35                A

     A03-1A43/1C43   11          A04-1B38/1D38   11     3    A03A43                A

     A03-1B03/1D03   11          A03-2B24/2D24   11    10    A03B74                A

     A03-1B04/1D04   11          A01-1A04/1C04   11     4    A04B72                A
     A03-1B04/1D04   22          A03-2A34/2C34   22    11    A04B72                A

     A03-1B24/1D24   11          A02-1B24/1D24   11     3    A03B24                A
     A03-1B24/1D24   22          A04-1B24/1D24   22     3    A03B24                A

     A03-1B25/1D25   11          A02-1B25/1D25   11     3    A03B25                A
     A03-1B25/1D25   22          A04-1B25/1D25   22     3    A03B25                A

     A03-1B26/1D26   11          A02-1B26/1D26   11     3    A03B26                A
     A03-1B26/1D26   22          A04-1B26/1D26   22     3    A03B26                A

     A03-1B27/1D27   11          A02-1B27/1D27   11     3    A03B27                A
     A03-1B27/1D27   22          A04-1B27/1D27   22     3    A03B27                A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A03-1B28/1D28	11	A02-1B28/1D28	11	3	A03B28			A		
A03-1B28/1D28	22	A04-1B28/1D28	22	3	A03B28			A		
A03-1B29/1D29	11	A02-1B29/1D29	11	3	A03B29			A		
A03-1B29/1D29	22	A04-1B29/1D29	22	3	A03B29			A		
A03-1B30/1D30	11	A02-1B30/1D30	11	3	A03B30			A		
A03-1B30/1D30	22	A04-1B30/1D30	22	3	A03B30			A		
A03-1B31/1D31	11	A02-1B31/1D31	11	3	A03B31			A		
A03-1B31/1D31	22	A04-1B31/1D31	22	3	A03B31			A		
A03-1B33/1D33	11	A04-2A28/2C28	11	8	A03B33			A		
A03-1B34/1D34	11	A03-1A13/1C13	11	5	A03B34			A		
A03-1B35/1D35	11	A02-2B04/2D04	11	5	A03B35			A		
A03-2A03/2C03	11	A04-2A13/2C13	11	4	A04A63			A		
A03-2A05/2C05	11	A04-1A38/1C38	11	5	A03A55			A		
A03-2A07/2C07	11	A02-2A07/2C07	11	3	A03A57			A		
A03-2A08/2C08	11	A02-2A08/2C08	11	3	A03A58			A		
A03-2A09/2C09	11	A02-2A09/2C09	11	3	A03A59			A		
A03-2A10/2C10	11	A02-2A10/2C10	11	3	A03A60			A		
A03-2A11/2C11	11	A02-2A11/2C11	11	3	A03A61			A		
A03-2A12/2C12	11	A02-2A12/2C12	11	3	A03A62			A		
A03-2A13/2C13	11	A02-2A13/2C13	11	3	A03A63			A		
A03-2A14/2C14	11	A02-2A14/2C14	11	3	A03A64			A		
A03-2A17/2C17	11	A04-1A42/1C42	11	6	A04A42			A		
A03-2A20/2C20	11	A04-2A25/2C25	11	3	A03A70			A		
A03-2A21/2C21	11	A04-1B34/1D34	11	7	A03A71			A		
A03-2A22/2C22	11	A02-2B18/2D18	11	3	A03A72			A		
A03-2A25/2C25	11	A02-2A43/2C43	11	4	A03A75			A		
A03-2A26/2C26	11	A01-2B14/2D14	11	4	A03A76			A		
A03-2A27/2C27	11	A04-2A18/2C18	11	4	A03A77			A		
A03-2A30*2C30	11	A04-2A30/2C30	11	3	A04A80			A		

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PAGE      9  PACK         A03                                                                                          DATE 87/05/22.
     ORIGIN          LEVS       DESTINATION       LEVS   LTH    SIGNAL   CBL   COLORS   REV   GA   TYPE ---------- DESCRIPTION ---------- QSE
     A03-2A31*2C31    11          A04-2A31/2C31    11      3    A04A81                    A
     A03-2A32/2C32    11          A04-1B41/1D41    11      7    A04B41                    A
     A03-2A33/2C33    11          A04-1B17/1D17    11     10    A03A83                    A
     A03-2A34/2C34    11          A04-2B22/2D22    11      4    A04B72                    A
     A03-2A34/2C34    22          A03-1B04/1D04    22     11    A04B72                    A
     A03-2A35*2C35    11          A05-2A35/2C35    11      4    A03A85                    A
     A03-2A36*2C36    11          A05-2A36/2C36    11      4    A03A86                    A
     A03-2A37*2C37    11          A05-2A37/2C37    11      4    A03A87                    A
     A03-2A38*2C38    11          A05-2A38/2C38    11      4    A03A88                    A
     A03-2A40*2C40    11          A05-2A40/2C40    11      4    A03A90                    A
     A03-2A41*2C41    11          A05-2A41/2C41    11      4    A03A91                    A
     A03-2A42*2C42    11          A05-2A42/2C42    11      4    A03A92                    A
     A03-2A43*2C43    11          A05-2A43/2C43    11      4    A03A93                    A
     A03-2B07/2D07    11          A02-2B07/2D07    11      3    A03B57                    A
     A03-2B08/2D08    11          A02-2B08/2D08    11      3    A03B58                    A
     A03-2B09/2D09    11          A02-2B09/2D09    11      3    A03B59                    A
     A03-2B10/2D10    11          A02-2B10/2D10    11      3    A03B60                    A
     A03-2B11/2D11    11          A02-2B11/2D11    11      3    A03B61                    A
     A03-2B12/2D12    11          A02-2B12/2D12    11      3    A03B62                    A
     A03-2B13/2D13    11          A02-2B13/2D13    11      3    A03B63                    A
     A03-2B14/2D14    11          A02-2B14/2D14    11      3    A03B64                    A
     A03-2B20/2D20    11          A02-2A03/2C03    11      4    A03B70                    A
     A03-2B21/2D21    11          A02-2B31/2D31    11      4    A03B71                    A
     A03-2B22/2D22    11          A04-1A17/1C17    11      9    A03B72                    A
     A03-2B24/2D24    11          A03-1B03/1D03    11     10    A03B74                    A
     A03-2B25/2D25    11          A07-1B31/1D31    11      8    A03B75                    A
     A03-2B26/2D26    11          A04-2B24/2D24    11      3    A03B76                    A
     A03-2B27/2D27    11          A04-2A19/2C19    11      3    A03B77                    A
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PAGE    10  PACK        A03                                                                                         DATE 87/05/22.
     ORIGIN         LEVS       DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A03-2B30*2D30  11          A04-2B30/2D30  11      3    A04B80                 A
     A03-2B31*2D31  11          A04-2B31/2D31  11      3    A04B81                 A
     A03-2B33/2D33  11          A04-2B12/2D12  11      5    A03B83                 A
     A03-2B34/2D34  11          A02-2A26/2C26  11      4    A03B84                 A
     A03-2B34/2D34  22          A04-2A09/2C09  22      5    A03B84                 A
     A03-2B35*2D35  11          A05-2B35/2D35  11      4    A03B85                 A
     A03-2B36*2D36  11          A05-2B36/2D36  11      4    A03B86                 A
     A03-2B37*2D37  11          A05-2B37/2D37  11      4    A03B87                 A
     A03-2B38*2D38  11          A05-2B38/2D38  11      4    A03B88                 A
     A03-2B40*2D40  11          A05-2B40/2D40  11      4    A03B90                 A
     A03-2B41*2D41  11          A05-2B41/2D41  11      4    A03B91                 A
     A03-2B42*2D42  11          A05-2B42/2D42  11      4    A03B92                 A
     A03-2B43*2D43  11          A05-2B43/2D43  11      4    A03B93                 A
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PAGE     11 PACK        A04                                                                                         DATE 87/05/22.
      ORIGIN         LEVS      DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

      A04-1A03/1C03  11          A02-1A03/1C03  11     13   A04A03                A

      A04-1A04/1C04  11          A01-1A07/1C07  11     13   A04A04                A

      A04-1A05/1C05  11          A02-1A05/1C05  11     13   A04A05                A

      A04-1A07/1C07  11          A10-1A07/1C07  11     13   A04A07                A         F

      A04-1A08/1C08  11          A02-1A08*1C08  11      4   A04A08                A
      A04-1A08/1C08  22          A05-1A08/1C08  22      3   A04A08                A

      A04-1A09/1C09  11          A02-1A09*1C09  11      4   A04A09                A
      A04-1A09/1C09  22          A05-1A09/1C09  22      3   A04A09                A

      A04-1A10/1C10  11          A02-1A10*1C10  11      4   A04A10                A
      A04-1A10/1C10  22          A05-1A10/1C10  22      3   A04A10                A

      A04-1A11/1C11  11          A02-1A11*1C11  11      4   A04A11                A
      A04-1A11/1C11  22          A05-1A11/1C11  22      3   A04A11                A

      A04-1A12/1C12  11          A02-1A12*1C12  11      4   A04A12                A
      A04-1A12/1C12  22          A05-1A12/1C12  22      3   A04A12                A

      A04-1A13/1C13  11          A02-1A13*1C13  11      4   A04A13                A
      A04-1A13/1C13  22          A05-1A13/1C13  22      3   A04A13                A

      A04-1A14/1C14  11          A02-1A14*1C14  11      4   A04A14                A
      A04-1A14/1C14  22          A05-1A14/1C14  22      3   A04A14                A

      A04-1A15/1C15  11          A02-1A15*1C15  11      4   A04A15                A
      A04-1A15/1C15  22          A05-1A15/1C15  22      3   A04A15                A

      A04-1A16/1C16  11          A02-1A16*1C16  11      4   A04A16                A
      A04-1A16/1C16  22          A05-1A16/1C16  22      3   A04A16                A

      A04-1A17/1C17  11          A03-2B22/2D22  11      9   A03B72                A

      A04-1A22/1C22  22          A09-2B19/2D19  22      9   A09B69                A

      A04-1A24/1C24  22          A03-1A24/1C24  22      3   A03A24                A

      A04-1A25/1C25  22          A03-1A25/1C25  22      3   A03A25                A

      A04-1A26/1C26  22          A03-1A26/1C26  22      3   A03A26                A

      A04-1A27/1C27  22          A03-1A27/1C27  22      3   A03A27                A

      A04-1A28/1C28  22          A03-1A28/1C28  22      3   A03A28                A

      A04-1A29/1C29  22          A03-1A29/1C29  22      3   A03A29                A

      A04-1A30/1C30  22          A03-1A30/1C30  22      3   A03A30                A
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PAGE 12 PACK A04 DATE 87/05/22.

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A04-1A31/1C31	22	A03-1A31/1C31	22	3	A03A31			A				
A04-1A32/1C32	11	A11-1B04/1D04	11	13	A04A32			A		F		
A04-1A33/1C33	11	A01-1A22/1C22	11	5	A04A33			A				
A04-1A34/1C34	11	A01-1A35/1C35	11	4	A02A74			A				
A04-1A34/1C34	22	A02-2A24/2C24	22	7	A02A74			A				
A04-1A35/1C35	11	A02-2B43/2D43	11	9	A02B93			A				
A04-1A36/1C36	11	A01-1A20/1C20	11	5	A01A20			A				
A04-1A36/1C36	22	A02-2B42/2D42	22	9	A01A20			A				
A04-1A37/1C37	11	A10-1B05/1D05	11	13	A04A37			A				
A04-1A38/1C38	11	A03-2A05/2C05	11	5	A03A55			A				
A04-1A40/1C40	11	A03-1A12/1C12	11	5	A04A40			A				
A04-1A41/1C41	11	A01-1B04/1D04	11	7	A01B04			A				
A04-1A42/1C42	11	A03-2A17/2C17	11	6	A04A42			A				
A04-1A43/1C43	11	A02-2A22/2C22	11	6	A04A43			A				
A04-1B03/1D03	11	A02-1B03/1D03	11	13	A04B03			A				
A04-1B04/1D04	11	A06-1B04/1D04	11	13	A04B04			A				
A04-1B05/1D05	11	A07-1B05/1D05	11	13	A04B05			A				
A04-1B08/1D08	11	A02-1B08*1D08	11	4	A04B08			A				
A04-1B08/1D08	22	A05-1B08/1D08	22	3	A04B08			A				
A04-1B09/1D09	11	A02-1B09*1D09	11	4	A04B09			A				
A04-1B09/1D09	22	A05-1B09/1D09	22	3	A04B09			A				
A04-1B10/1D10	11	A02-1B10*1D10	11	4	A04B10			A				
A04-1B10/1D10	22	A05-1B10/1D10	22	3	A04B10			A				
A04-1B11/1D11	11	A02-1B11*1D11	11	4	A04B11			A				
A04-1B11/1D11	22	A05-1B11/1D11	22	3	A04B11			A				
A04-1B12/1D12	11	A02-1B12*1D12	11	4	A04B12			A				
A04-1B12/1D12	22	A05-1B12/1D12	22	3	A04B12			A				
A04-1B13/1D13	11	A02-1B13*1D13	11	4	A04B13			A				
A04-1B13/1D13	22	A05-1B13/1D13	22	3	A04B13			A				
A04-1B14/1D14	11	A02-1B14*1D14	11	4	A04B14			A				
A04-1B14/1D14	22	A05-1B14/1D14	22	3	A04B14			A				
A04-1B15/1D15	11	A02-1B15*1D15	11	4	A04B15			A				

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------	QSE
A04-1B15/1D15	22	A05-1B15/1D15	22	3	A04B15			A			
A04-1B16/1D16	11	A02-1B16*1D16	11	4	A04B16			A			
A04-1B16/1D16	22	A05-1B16/1D16	22	3	A04B16			A			
A04-1B17/1D17	11	A03-2A33/2C33	11	10	A03A83			A			
A04-1B22/1D22	11	A03-1A34/1C34	11	4	A03A34			A			
A04-1B24/1D24	22	A03-1B24/1D24	22	3	A03B24			A			
A04-1B25/1D25	22	A03-1B25/1D25	22	3	A03B25			A			
A04-1B26/1D26	22	A03-1B26/1D26	22	3	A03B26			A			
A04-1B27/1D27	22	A03-1B27/1D27	22	3	A03B27			A			
A04-1B28/1D28	22	A03-1B28/1D28	22	3	A03B28			A			
A04-1B29/1D29	22	A03-1B29/1D29	22	3	A03B29			A			
A04-1B30/1D30	22	A03-1B30/1D30	22	3	A03B30			A			
A04-1B31/1D31	22	A03-1B31/1D31	22	3	A03B31			A			
A04-1B32/1D32	11	A10-2B26/2D26	11	9	A04B32			A			
A04-1B33/1D33	11	A14-1B04/1D04	11	13	A04B33			A			
A04-1B34/1D34	11	A03-2A21/2C21	11	7	A03A71			A			
A04-1B35/1D35	22	A02-2A41/2C41	22	9	A01B29			A			
A04-1B36/1D36	11	A02-2B16/2D16	11	6	A02B66			A			
A04-1B37/1D37	11	A07-1A07/1C07	11	13	A04A07			A			
A04-1B38/1D38	11	A03-1A43/1C43	11	3	A03A43			A			
A04-1B40/1D40	11	A07-1A34/1C34	11	4	A07A34			A			
A04-1B41/1D41	11	A03-2A32/2C32	11	7	A04B41			A			
A04-1B42/1D42	11	A02-1A19/1C19	11	5	A02A19			A			
A04-1B43/1D43	11	A01-1B03/1D03	11	7	A01B03			A			
A04-2A03/2C03	11	A02-2A25/2C25	11	5	A04A53			A			
A04-2A04/2C04	11	A02-2B27/2D27	11	5	A02B77			A			
A04-2A05/2C05	11	A01-1A29/1C29	11	6	A01A29			A			
A04-2A05/2C05	22	A02-2B35/2D35	22	6	A01A29			A			

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PAGE    14  PACK        A04                                                                                                          DATE 87/05/22.
     ORIGIN         LEVS       DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A04-2A07/2C07   11         A01-1B14/1D14    11    8    A01B14                A
                                                                                   
     A04-2A08/2C08   11         A01-1A14/1C14    11    8    A01A14                A

     A04-2A09/2C09   11         A08-2B16/2D16    11    5    A03B84                A
     A04-2A09/2C09   22         A03-2B34/2D34    22    5    A03B84                A

     A04-2A10/2C10   11         A06-1A04/1C04    11   13    A04A60                A

     A04-2A11/2C11   11         A08-1A04/1C04    11   13    A04A61                A

     A04-2A12/2C12   11         A14-1A04/1C04    11   13    A04A62                A

     A04-2A13/2C13   11         A03-2A03/2C03    11    4    A04A63                A

     A04-2A14/2C14   11         A02-1A21/1C21    11    8    A04A64                A

     A04-2A15/2C15   11         A02-2A40/2C40    11    5    A04A65                A

     A04-2A16/2C16   11         A08-1B03/1D03    11   13    A04A66                A

     A04-2A17/2C17   11         A06-2B14/2D14    11    4    A06B64                A

     A04-2A18/2C18   11         A03-2A27/2C27    11    4    A03A77                A

     A04-2A19/2C19   11         A03-2B27/2D27    11    3    A03B77                A

     A04-2A20/2C20   11         A02-2A37/2C37    11    5    A04A70                A

     A04-2A21/2C21   11         A01-2B13/2D13    11    4    A01B63                A

     A04-2A22/2C22   11         A07-1A38/1C38    11    7    A07A38                A

     A04-2A24/2C24   22         A02-2A38/2C38    22    4    A04A74                A

     A04-2A25/2C25   11         A03-2A20/2C20    11    3    A03A70                A

     A04-2A26/2C26   11         A02-2A20/2C20    11    4    A02A70                A

     A04-2A27/2C27   11         A01-2A09/2C09    11    5    A01A59                A

     A04-2A28/2C28   11         A03-1B33/1D33    11    8    A03B33                A

     A04-2A29/2C29   11         A08-1B05/1D05    11   13    A04A79                A      F

     A04-2A30/2C30   11         A03-2A30*2C30    11    3    A04A80                A
     A04-2A30/2C30   22         A06-2A30/2C30    22    4    A04A80                A

     A04-2A31/2C31   11         A03-2A31*2C31    11    3    A04A81                A
     A04-2A31/2C31   22         A06-2A31/2C31    22    4    A04A81                A

     A04-2A32/2C32   11         A06-1A05/1C05    11   13    A04A82                A      F

     A04-2A33/2C33   11         A11-1A05/1C05    11   13    A04A83                A      F
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A04-2A34/2C34	11	A02-2A34*2C34	11	4	A04A84			A		
A04-2A34/2C34	22	A05-2A34/2C34	22	3	A04A84			A		
A04-2B03/2D03	11	A01-1A03/1C03	11	8	A04B53			A		
A04-2B04/2D04	11	A02-2B29/2D29	11	5	A02B79			A		
A04-2B04/2D04	22	A08-1A40/1C40	22	5	A02B79			A		
A04-2B05/2D05	22	A02-2B32/2D32	22	5	A01B30			A		
A04-2B07/2D07	11	A02-1A35/1C35	11	6	A04B57			A		
A04-2B08/2D08	11	A08-1B35/1D35	11	6	A08B35			A		
A04-2B09/2D09	11	A02-1A04/1C04	11	13	A04B59			A		
A04-2B10/2D10	11	A01-2A04/2C04	11	5	A04B60			A		
A04-2B11/2D11	11	A11-1A04/1C04	11	13	A04B61			A		
A04-2B12/2D12	11	A03-2B33/2D33	11	5	A03B83			A		
A04-2B13/2D13	11	A06-1B03/1D03	11	13	A04B63			A		
A04-2B14/2D14	11	A07-1B03/1D03	11	13	A04B64			A		
A04-2B15/2D15	11	A02-2B28/2D28	11	4	A08B54			A		
A04-2B15/2D15	22	A08-2B04/2D04	22	5	A08B54			A		
A04-2B16/2D16	11	A01-1B22/1D22	11	8	A04B66			A		
A04-2B17/2D17	11	A01-1A19/1C19	11	8	A04B67			A		
A04-2B18/2D18	11	A02-2B17/2D17	11	4	A04B68			A		
A04-2B19/2D19	11	A11-1B03/1D03	11	13	A04B69			A		
A04-2B20/2D20	11	A14-1B03/1D03	11	13	A04B70			A		
A04-2B21/2D21	11	A06-1A03/1C03	11	13	A04B71			A		
A04-2B22/2D22	11	A03-2A34/2C34	11	4	A04B72			A		
A04-2B24/2D24	11	A03-2B26/2D26	11	3	A03B76			A		
A04-2B25/2D25	11	A01-2B10/2D10	11	5	A04B75			A		
A04-2B26/2D26	11	A08-1A03/1C03	11	13	A04B76			A		
A04-2B27/2D27	11	A11-1A03/1C03	11	13	A04B77			A		
A04-2B28/2D28	11	A14-1A03/1C03	11	13	A04B78			A		

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PAGE    16  PACK        A04                                                                                             DATE 87/05/22.
     ORIGIN         LEVS       DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE --------- DESCRIPTION ----------- QSE

     A04-2B29/2D29  11           A03-1A32/1C32  11     8    A04B79                 A

     A04-2B30/2D30  11           A03-2B30*2D30  11     3    A04B80                 A
     A04-2B30/2D30  22           A06-2B30/2D30  22     4    A04B80                 A

     A04-2B31/2D31  11           A03-2B31*2D31  11     3    A04B81                 A
     A04-2B31/2D31  22           A06-2B31/2D31  22     4    A04B81                 A

     A04-2B32*2D32  11           A06-2B32/2D32  11     4    A04B82                 A

     A04-2B33/2D33  11           A02-2B33*2D33  11     4    A04B83                 A
     A04-2B33/2D33  22           A05-2B33/2D33  22     3    A04B83                 A

     A04-2B34/2D34  11           A02-2B34*2D34  11     4    A04B84                 A
     A04-2B34/2D34  22           A05-2B34/2D34  22     3    A04B84                 A
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PAGE     17  PACK         A05                                                                                           DATE 87/05/22.
      ORIGIN         LEVS       DESTINATION     LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

      A05-1A07/1C07  11           A06-1B10/1D10  11     3   A06B10                 A

      A05-1A08/1C08  11           A07-1A08/1C08  11     4   A04A08                 A
      A05-1A08/1C08  22           A04-1A08/1C08  22     3   A04A08                 A

      A05-1A09/1C09  11           A07-1A09/1C09  11     4   A04A09                 A
      A05-1A09/1C09  22           A04-1A09/1C09  22     3   A04A09                 A

      A05-1A10/1C10  11           A07-1A10/1C10  11     4   A04A10                 A
      A05-1A10/1C10  22           A04-1A10/1C10  22     3   A04A10                 A

      A05-1A11/1C11  11           A07-1A11/1C11  11     4   A04A11                 A
      A05-1A11/1C11  22           A04-1A11/1C11  22     3   A04A11                 A

      A05-1A12/1C12  11           A07-1A12/1C12  11     4   A04A12                 A
      A05-1A12/1C12  22           A04-1A12/1C12  22     3   A04A12                 A

      A05-1A13/1C13  11           A07-1A13/1C13  11     4   A04A13                 A
      A05-1A13/1C13  22           A04-1A13/1C13  22     3   A04A13                 A

      A05-1A14/1C14  11           A07-1A14/1C14  11     4   A04A14                 A
      A05-1A14/1C14  22           A04-1A14/1C14  22     3   A04A14                 A

      A05-1A15/1C15  11           A07-1A15/1C15  11     4   A04A15                 A
      A05-1A15/1C15  22           A04-1A15/1C15  22     3   A04A15                 A

      A05-1A16/1C16  11           A07-1A16/1C16  11     4   A04A16                 A
      A05-1A16/1C16  22           A04-1A16/1C16  22     3   A04A16                 A

      A05-1A17/1C17  11           A06-1A17/1C17  11     3   A06A17                 A

      A05-1A18/1C18  11           A06-1A18/1C18  11     3   A06A18                 A

      A05-1A19/1C19  11           A06-1A19/1C19  11     3   A06A19                 A

      A05-1A20/1C20  11           A06-1A20/1C20  11     3   A05A20                 A

      A05-1A21/1C21  11           A06-1A21/1C21  11     3   A06A21                 A

      A05-1A22/1C22  11           A06-1A22/1C22  11     3   A06A22                 A

      A05-1A24/1C24  11           A06-1A24/1C24  11     3   A06A24                 A

      A05-1A25/1C25  11           A06-1A25/1C25  11     3   A06A25                 A

      A05-1A26/1C26  11           A06-1A26/1C26  11     3   A06A26                 A

      A05-1A27/1C27  11           A06-1A27/1C27  11     3   A06A27                 A

      A05-1A28/1C28  11           A06-1A28/1C28  11     3   A06A28                 A

      A05-1A29/1C29  11           A06-1A29/1C29  11     3   A06A29                 A
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PAGE 18 PACK A05 DATE 87/05/22.

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION -----------	QSE
A05-1A30/1C30	11	A06-1A30/1C30	11	3	A05A30			A			
A05-1A31/1C31	11	A06-1A31/1C31	11	3	A05A31			A			
A05-1A32/1C32	11	A06-1A32/1C32	11	3	A05A32			A			
A05-1A33/1C33	11	A06-1A33/1C33	11	3	A05A33			A			
A05-1A34/1C34	11	A06-1A34/1C34	11	3	A05A34			A			
A05-1A35/1C35	11	A06-1A35/1C35	11	3	A05A35			A			
A05-1A36/1C36	11	A06-1A36/1C36	11	3	A05A36			A			
A05-1A37/1C37	11	A06-1A37/1C37	11	3	A05A37			A			
A05-1A38/1C38	11	A06-1A38/1C38	11	3	A05A38			A			
A05-1A40/1C40	11	A06-1A40/1C40	11	3	A06A40			A			
A05-1A41/1C41	11	A06-1A41/1C41	11	3	A06A41			A			
A05-1A42/1C42	11	A06-1A42/1C42	11	3	A05A42			A			
A05-1A43/1C43	11	A06-1A43/1C43	11	3	A06A43			A			
A05-1B08/1D08	11	A07-1B08/1D08	11	4	A04B08			A			
A05-1B08/1D08	22	A04-1B08/1D08	22	3	A04B08			A			
A05-1B09/1D09	11	A07-1B09/1D09	11	4	A04B09			A			
A05-1B09/1D09	22	A04-1B09/1D09	22	3	A04B09			A			
A05-1B10/1D10	11	A07-1B10/1D10	11	4	A04B10			A			
A05-1B10/1D10	22	A04-1B10/1D10	22	3	A04B10			A			
A05-1B11/1D11	11	A07-1B11/1D11	11	4	A04B11			A			
A05-1B11/1D11	22	A04-1B11/1D11	22	3	A04B11			A			
A05-1B12/1D12	11	A07-1B12/1D12	11	4	A04B12			A			
A05-1B12/1D12	22	A04-1B12/1D12	22	3	A04B12			A			
A05-1B13/1D13	11	A07-1B13/1D13	11	4	A04B13			A			
A05-1B13/1D13	22	A04-1B13/1D13	22	3	A04B13			A			
A05-1B14/1D14	11	A07-1B14/1D14	11	4	A04B14			A			
A05-1B14/1D14	22	A04-1B14/1D14	22	3	A04B14			A			
A05-1B15/1D15	11	A07-1B15/1D15	11	4	A04B15			A			
A05-1B15/1D15	22	A04-1B15/1D15	22	3	A04B15			A			
A05-1B16/1D16	11	A07-1B16/1D16	11	4	A04B16			A			
A05-1B16/1D16	22	A04-1B16/1D16	22	3	A04B16			A			
A05-1B17/1D17	11	A06-1B17/1D17	11	3	A06B17			A			

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PAGE     19  PACK        A05                                                                                                  DATE 87/05/22.
     ORIGIN          LEVS        DESTINATION       LEVS   LTH    SIGNAL   CBL   COLORS   REV   GA   TYPE ---------- DESCRIPTION ----------- QSE

     A05-1B18/1D18   11          A06-1B18/1D18     11       3    A06B18                   A
     A05-1B19/1D19   11          A06-1B19/1D19     11       3    A06B19                   A
     A05-1B20/1D20   11          A06-1B20/1D20     11       3    A05B20                   A
     A05-1B21/1D21   11          A06-1B21/1D21     11       3    A05B21                   A
     A05-1B22/1D22   11          A06-1B22/1D22     11       3    A06B22                   A
     A05-1B24/1D24   11          A06-1B24/1D24     11       3    A06B24                   A
     A05-1B25/1D25   11          A06-1B25/1D25     11       3    A06B25                   A
     A05-1B26/1D26   11          A06-1B26/1D26     11       3    A06B26                   A
     A05-1B27/1D27   11          A06-1B27/1D27     11       3    A06B27                   A
     A05-1B28/1D28   11          A06-1B28/1D28     11       3    A06B28                   A
     A05-1B29/1D29   11          A06-1B29/1D29     11       3    A06B29                   A
     A05-1B30/1D30   11          A06-1B30/1D30     11       3    A05B30                   A
     A05-1B31/1D31   11          A06-1B31/1D31     11       3    A05B31                   A
     A05-1B32/1D32   11          A06-1B32/1D32     11       3    A05B32                   A
     A05-1B33/1D33   11          A06-1B33/1D33     11       3    A05B33                   A
     A05-1B34/1D34   11          A06-1B34/1D34     11       3    A05B34                   A
     A05-1B35/1D35   11          A06-1B35/1D35     11       3    A05B35                   A
     A05-1B36/1D36   11          A06-1B36/1D36     11       3    A05B36                   A
     A05-1B37/1D37   11          A06-1B37/1D37     11       3    A05B37                   A
     A05-1B38/1D38   11          A06-1B38/1D38     11       3    A05B38                   A
     A05-1B40/1D40   11          A06-1B40/1D40     11       3    A06B40                   A
     A05-1B41/1D41   11          A06-1B41/1D41     11       3    A06B41                   A
     A05-1B42/1D42   11          A06-1B42/1D42     11       3    A05B42                   A
     A05-1B43/1D43   11          A06-1B43/1D43     11       3    A06B43                   A
     A05-2A03/2C03   11          A06-2A03/2C03     11       3    A06A53                   A
     A05-2A04/2C04   11          A06-2A04/2C04     11       3    A06A54                   A
     A05-2A05/2C05   11          A06-2A05/2C05     11       3    A06A55                   A
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PAGE    20  PACK        A05                                                                                   DATE 87/05/22.
     ORIGIN         LEVS       DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A05-2A07/2C07  11          A06-2A07/2C07  11     3   A06A57                 A
     A05-2A08/2C08  11          A06-2A08/2C08  11     3   A06A58                 A
     A05-2A09/2C09  11          A06-2A09/2C09  11     3   A05A59                 A
     A05-2A10/2C10  11          A06-2A10/2C10  11     3   A06A60                 A
     A05-2A11/2C11  11          A06-2A11/2C11  11     3   A06A61                 A
     A05-2A12/2C12  11          A06-2A12/2C12  11     3   A05A62                 A
     A05-2A13/2C13  11          A05-2B13/2D13  11     3   A08B38                 A
     A05-2A14/2C14  11          A05-2B14/2D14  11     3   A08B38                 A
     A05-2A14/2C14  22          A05-2B13/2D13  22     3   A08B38                 A
     A05-2A15/2C15  11          A05-2B15/2D15  11     3   A08B38                 A
     A05-2A15/2C15  22          A05-2B14/2D14  22     3   A08B38                 A
     A05-2A16/2C16  11          A05-2B16/2D16  11     3   A08B38                 A
     A05-2A16/2C16  22          A05-2B15/2D15  22     3   A08B38                 A
     A05-2A17/2C17  11          A05-2B17/2D17  11     3   A08B38                 A
     A05-2A17/2C17  22          A05-2B16/2D16  22     3   A08B38                 A
     A05-2A18/2C18  11          A05-2B18/2D18  11     3   A08B38                 A
     A05-2A18/2C18  22          A05-2B17/2D17  22     3   A08B38                 A
     A05-2A19/2C19  11          A05-2B19/2D19  11     3   A08B38                 A
     A05-2A19/2C19  22          A05-2B18/2D18  22     3   A08B38                 A
     A05-2A20/2C20  11          A05-2B20/2D20  11     3   A08B38                 A
     A05-2A20/2C20  22          A05-2B19/2D19  22     3   A08B38                 A
     A05-2A21/2C21  11          A06-2A21/2C21  11     3   A06A71                 A
     A05-2A22/2C22  11          A06-2A22/2C22  11     3   A06A72                 A
     A05-2A24/2C24  11          A06-2A24/2C24  11     3   A06A74                 A
     A05-2A25/2C25  11          A14-1B19/1D19  11    11   A05A75                 A
     A05-2A26/2C26  11          A14-1B18/1D18  11    11   A05A76                 A
     A05-2A27/2C27  11          A06-2A27/2C27  11     3   A06A77                 A
     A05-2A28/2C28  11          A06-2A28/2C28  11     3   A06A78                 A
     A05-2A33/2C33  11          A06-1A10/1C10  11    10   A06A10                 A
     A05-2A34/2C34  11          A07-2A34/2C34  11     4   A04A84                 A
     A05-2A34/2C34  22          A04-2A34/2C34  22     3   A04A84                 A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A05-2A35/2C35	11	A03-2A35*2C35	11	4	A03A85			A		
A05-2A35/2C35	22	A07-2A35/2C35	22	4	A03A85			A		
A05-2A36/2C36	11	A03-2A36*2C36	11	4	A03A86			A		
A05-2A36/2C36	22	A07-2A36/2C36	22	4	A03A86			A		
A05-2A37/2C37	11	A03-2A37*2C37	11	4	A03A87			A		
A05-2A37/2C37	22	A07-2A37/2C37	22	4	A03A87			A		
A05-2A38/2C38	11	A03-2A38*2C38	11	4	A03A88			A		
A05-2A38/2C38	22	A07-2A38/2C38	22	4	A03A88			A		
A05-2A40/2C40	11	A03-2A40*2C40	11	4	A03A90			A		
A05-2A40/2C40	22	A07-2A40/2C40	22	4	A03A90			A		
A05-2A41/2C41	11	A03-2A41*2C41	11	4	A03A91			A		
A05-2A41/2C41	22	A07-2A41/2C41	22	4	A03A91			A		
A05-2A42/2C42	11	A03-2A42*2C42	11	4	A03A92			A		
A05-2A42/2C42	22	A07-2A42/2C42	22	4	A03A92			A		
A05-2A43/2C43	11	A03-2A43*2C43	11	4	A03A93			A		
A05-2A43/2C43	22	A07-2A43/2C43	22	4	A03A93			A		
A05-2B03/2D03	11	A06-2B03/2D03	11	3	A06B53			A		
A05-2B04/2D04	11	A06-2B04/2D04	11	3	A06B54			A		
A05-2B05/2D05	11	A06-2B05/2D05	11	3	A06B55			A		
A05-2B07/2D07	11	A06-2B07/2D07	11	3	A06B57			A		
A05-2B08/2D08	11	A06-2B08/2D08	11	3	A06B58			A		
A05-2B09/2D09	11	A06-2B09/2D09	11	3	A05B59			A		
A05-2B10/2D10	11	A06-2B10/2D10	11	3	A06B60			A		
A05-2B11/2D11	11	A06-2B11/2D11	11	3	A06B61			A		
A05-2B12/2D12	11	A06-2B12/2D12	11	3	A05B62			A		
A05-2B13/2D13	11	A05-2A13/2C13	11	3	A08B38			A		
A05-2B13/2D13	22	A05-2A14/2C14	22	3	A08B38			A		
A05-2B14/2D14	11	A05-2A14/2C14	11	3	A08B38			A		
A05-2B14/2D14	22	A05-2A15/2C15	22	3	A08B38			A		
A05-2B15/2D15	11	A05-2A15/2C15	11	3	A08B38			A		
A05-2B15/2D15	22	A05-2A16/2C16	22	3	A08B38			A		
A05-2B16/2D16	11	A05-2A16/2C16	11	3	A08B38			A		
A05-2B16/2D16	22	A05-2A17/2C17	22	3	A08B38			A		

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A05-2B17/2D17	11	A05-2A17/2C17	11	3	A08B38			A				
A05-2B17/2D17	22	A05-2A18/2C18	22	3	A08B38			A				
A05-2B18/2D18	11	A05-2A18/2C18	11	3	A08B38			A				
A05-2B18/2D18	22	A05-2A19/2C19	22	3	A08B38			A				
A05-2B19/2D19	11	A05-2A19/2C19	11	3	A08B38			A				
A05-2B19/2D19	22	A05-2A20/2C20	22	3	A08B38			A				
A05-2B20/2D20	11	A05-2A20/2C20	11	3	A08B38			A				
A05-2B20/2D20	22	A08-1B38/1D38	22	7	A08B38			A				
A05-2B21/2D21	11	A06-2B21/2D21	11	3	A06B71			A				
A05-2B22/2D22	11	A06-2B22/2D22	11	3	A06B72			A				
A05-2B24/2D24	11	A06-2B24/2D24	11	3	A05B74			A				
A05-2B25/2D25	11	A14-1A19/1C19	11	11	A05B75			A				
A05-2B26/2D26	11	A14-1A18/1C18	11	11	A05B76			A				
A05-2B27/2D27	11	A06-2B27/2D27	11	3	A06B77			A				
A05-2B28/2D28	11	A06-2B28/2D28	11	3	A05B78			A				
A05-2B33/2D33	11	A07-2B33/2D33	11	4	A04B83			A				
A05-2B33/2D33	22	A04-2B33/2D33	22	3	A04B83			A				
A05-2B34/2D34	11	A07-2B34/2D34	11	4	A04B84			A				
A05-2B34/2D34	22	A04-2B34/2D34	22	3	A04B84			A				
A05-2B35/2D35	11	A03-2B35*2D35	11	4	A03B85			A				
A05-2B35/2D35	22	A07-2B35/2D35	22	4	A03B85			A				
A05-2B36/2D36	11	A03-2B36*2D36	11	4	A03B86			A				
A05-2B36/2D36	22	A07-2B36/2D36	22	4	A03B86			A				
A05-2B37/2D37	11	A03-2B37*2D37	11	4	A03B87			A				
A05-2B37/2D37	22	A07-2B37/2D37	22	4	A03B87			A				
A05-2B38/2D38	11	A03-2B38*2D38	11	4	A03B88			A				
A05-2B38/2D38	22	A07-2B38/2D38	22	4	A03B88			A				
A05-2B40/2D40	11	A03-2B40*2D40	11	4	A03B90			A				
A05-2B40/2D40	22	A07-2B40/2D40	22	4	A03B90			A				
A05-2B41/2D41	11	A03-2B41*2D41	11	4	A03B91			A				
A05-2B41/2D41	22	A07-2B41/2D41	22	4	A03B91			A				
A05-2B42/2D42	11	A03-2B42*2D42	11	4	A03B92			A				
A05-2B42/2D42	22	A07-2B42/2D42	22	4	A03B92			A				

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PAGE    23  PACK        A05                                                                                      DATE 87/05/22.
     ORIGIN          LEVS       DESTINATION      LEVS  LTH    SIGNAL   CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A05-2B43/2D43   11           A03-2B43*2D43  11     4    A03B93                   A
     A05-2B43/2D43   22           A07-2B43/2D43  22     4    A03B93                   A
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PAGE 24 PACK A06 DATE 87/05/22.

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A06-1A03/1C03	11	A04-2B21/2D21	11	13	A04B71			A				
A06-1A04/1C04	11	A04-2A10/2C10	11	13	A04A60			A				
A06-1A05/1C05	11	A04-2A32/2C32	11	13	A04A82			A		F		
A06-1A10/1C10	11	A05-2A33/2C33	11	10	A06A10			A				
A06-1A17/1C17	11	A05-1A17/1C17	11	3	A06A17			A				
A06-1A18/1C18	11	A05-1A18/1C18	11	3	A06A18			A				
A06-1A19/1C19	11	A05-1A19/1C19	11	3	A06A19			A				
A06-1A20/1C20	11	A05-1A20/1C20	11	3	A05A20			A				
A06-1A21/1C21	11	A05-1A21/1C21	11	3	A06A21			A				
A06-1A22/1C22	11	A05-1A22/1C22	11	3	A06A22			A				
A06-1A24/1C24	11	A05-1A24/1C24	11	3	A06A24			A				
A06-1A25/1C25	11	A05-1A25/1C25	11	3	A06A25			A				
A06-1A26/1C26	11	A05-1A26/1C26	11	3	A06A26			A				
A06-1A27/1C27	11	A05-1A27/1C27	11	3	A06A27			A				
A06-1A28/1C28	11	A05-1A28/1C28	11	3	A06A28			A				
A06-1A29/1C29	11	A05-1A29/1C29	11	3	A06A29			A				
A06-1A30/1C30	11	A05-1A30/1C30	11	3	A05A30			A				
A06-1A31/1C31	11	A05-1A31/1C31	11	3	A05A31			A				
A06-1A32/1C32	11	A05-1A32/1C32	11	3	A05A32			A				
A06-1A33/1C33	11	A05-1A33/1C33	11	3	A05A33			A				
A06-1A34/1C34	11	A05-1A34/1C34	11	3	A05A34			A				
A06-1A35/1C35	11	A05-1A35/1C35	11	3	A05A35			A				
A06-1A36/1C36	11	A05-1A36/1C36	11	3	A05A36			A				
A06-1A37/1C37	11	A05-1A37/1C37	11	3	A05A37			A				
A06-1A38/1C38	11	A05-1A38/1C38	11	3	A05A38			A				
A06-1A40/1C40	11	A05-1A40/1C40	11	3	A06A40			A				
A06-1A41/1C41	11	A05-1A41/1C41	11	3	A06A41			A				

PAGE 25 PACK A06 DATE 87/05/22.

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A06-1A42/1C42	11	A05-1A42/1C42	11	3	A05A42			A				
A06-1A43/1C43	11	A05-1A43/1C43	11	3	A06A43			A				
A06-1B03/1D03	11	A04-2B13/2D13	11	13	A04B63			A				
A06-1B04/1D04	11	A04-1B04/1D04	11	13	A04B04			A				
A06-1B10/1D10	11	A05-1A07/1C07	11	3	A06B10			A				
A06-1B17/1D17	11	A05-1B17/1D17	11	3	A06B17			A				
A06-1B18/1D18	11	A05-1B18/1D18	11	3	A06B18			A				
A06-1B19/1D19	11	A05-1B19/1D19	11	3	A06B19			A				
A06-1B20/1D20	11	A05-1B20/1D20	11	3	A05B20			A				
A06-1B21/1D21	11	A05-1B21/1D21	11	3	A05B21			A				
A06-1B22/1D22	11	A05-1B22/1D22	11	3	A06B22			A				
A06-1B24/1D24	11	A05-1B24/1D24	11	3	A06B24			A				
A06-1B25/1D25	11	A05-1B25/1D25	11	3	A06B25			A				
A06-1B26/1D26	11	A05-1B26/1D26	11	3	A06B26			A				
A06-1B27/1D27	11	A05-1B27/1D27	11	3	A06B27			A				
A06-1B28/1D28	11	A05-1B28/1D28	11	3	A06B28			A				
A06-1B29/1D29	11	A05-1B29/1D29	11	3	A06B29			A				
A06-1B30/1D30	11	A05-1B30/1D30	11	3	A05B30			A				
A06-1B31/1D31	11	A05-1B31/1D31	11	3	A05B31			A				
A06-1B32/1D32	11	A05-1B32/1D32	11	3	A05B32			A				
A06-1B33/1D33	11	A05-1B33/1D33	11	3	A05B33			A				
A06-1B34/1D34	11	A05-1B34/1D34	11	3	A05B34			A				
A06-1B35/1D35	11	A05-1B35/1D35	11	3	A05B35			A				
A06-1B36/1D36	11	A05-1B36/1D36	11	3	A05B36			A				
A06-1B37/1D37	11	A05-1B37/1D37	11	3	A05B37			A				
A06-1B38/1D38	11	A05-1B38/1D38	11	3	A05B38			A				
A06-1B40/1D40	11	A05-1B40/1D40	11	3	A06B40			A				

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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	---------- DESCRIPTION -----------	QSE
A06-1B41/1D41	11	A05-1B41/1D41	11	3	A06B41			A				
A06-1B42/1D42	11	A05-1B42/1D42	11	3	A05B42			A				
A06-1B43/1D43	11	A05-1B43/1D43	11	3	A06B43			A				
A06-2A03/2C03	11	A05-2A03/2C03	11	3	A06A53			A				
A06-2A04/2C04	11	A05-2A04/2C04	11	3	A06A54			A				
A06-2A05/2C05	11	A05-2A05/2C05	11	3	A06A55			A				
A06-2A07/2C07	11	A05-2A07/2C07	11	3	A06A57			A				
A06-2A08/2C08	11	A05-2A08/2C08	11	3	A06A58			A				
A06-2A09/2C09	11	A05-2A09/2C09	11	3	A05A59			A				
A06-2A10/2C10	11	A05-2A10/2C10	11	3	A06A60			A				
A06-2A11/2C11	11	A05-2A11/2C11	11	3	A06A61			A				
A06-2A12/2C12	11	A05-2A12/2C12	11	3	A05A62			A				
A06-2A13/2C13	11	A14-1A17/1C17	11	10	A14A17			A				
A06-2A14/2C14	11	A14-2A14/2C14	11	7	A14A64			A				
A06-2A21/2C21	11	A05-2A21/2C21	11	3	A06A71			A				
A06-2A22/2C22	11	A05-2A22/2C22	11	3	A06A72			A				
A06-2A24/2C24	11	A05-2A24/2C24	11	3	A06A74			A				
A06-2A27/2C27	11	A05-2A27/2C27	11	3	A06A77			A				
A06-2A28/2C28	11	A05-2A28/2C28	11	3	A06A78			A				
A06-2A30/2C30	11	A14-2A30/2C30	11	7	A04A80			A				
A06-2A30/2C30	22	A04-2A30/2C30	22	4	A04A80			A				
A06-2A31/2C31	11	A14-2A31/2C31	11	7	A04A81			A				
A06-2A31/2C31	22	A04-2A31/2C31	22	4	A04A81			A				
A06-2B03/2D03	11	A05-2B03/2D03	11	3	A06B53			A				
A06-2B04/2D04	11	A05-2B04/2D04	11	3	A06B54			A				
A06-2B05/2D05	11	A05-2B05/2D05	11	3	A06B55			A				
A06-2B07/2D07	11	A05-2B07/2D07	11	3	A06B57			A				
A06-2B08/2D08	11	A05-2B08/2D08	11	3	A06B58			A				

PAGE 27 PACK A06 DATE 87/05/22.

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A06-2B09/2D09	11	A05-2B09/2D09	11	3	A05B59			A		
A06-2B10/2D10	11	A05-2B10/2D10	11	3	A06B60			A		
A06-2B11/2D11	11	A05-2B11/2D11	11	3	A06B61			A		
A06-2B12/2D12	11	A05-2B12/2D12	11	3	A05B62			A		
A06-2B13/2D13	11	A14-1B17/1D17	11	10	A06B63			A		
A06-2B14/2D14	11	A04-2A17/2C17	11	4	A06B64			A		
A06-2B21/2D21	11	A05-2B21/2D21	11	3	A06B71			A		
A06-2B22/2D22	11	A05-2B22/2D22	11	3	A06B72			A		
A06-2B24/2D24	11	A05-2B24/2D24	11	3	A05B74			A		
A06-2B27/2D27	11	A05-2B27/2D27	11	3	A06B77			A		
A06-2B28/2D28	11	A05-2B28/2D28	11	3	A05B78			A		
A06-2B30/2D30	11	A14-2B30/2D30	11	7	A04B80			A		
A06-2B30/2D30	22	A04-2B30/2D30	22	4	A04B80			A		
A06-2B31/2D31	11	A09-2B31/2D31	11	4	A04B81			A		
A06-2B31/2D31	22	A04-2B31/2D31	22	4	A04B81			A		
A06-2B32/2D32	11	A04-2B32*2D32	11	4	A04B82			A		
A06-2B32/2D32	22	A14-2B32/2D32	22	7	A04B82			A		

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PAGE    28  PACK       A07                                                                                          DATE 87/05/22.
      ORIGIN         LEVS       DESTINATION     LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

      A07-1A03/1C03   11          A08-2A31/2C31   11    11   A08A81                 A

      A07-1A05/1C05   11          A08-2B32/2D32   11    11   A08B82                 A

      A07-1A07/1C07   11          A04-1B37/1D37   11    13   A04A07                 A

      A07-1A08/1C08   11          A05-1A08/1C08   11     4   A04A08                 A
      A07-1A08/1C08   22          A11-1A08/1C08   22     5   A04A08                 A

      A07-1A09/1C09   11          A05-1A09/1C09   11     4   A04A09                 A
      A07-1A09/1C09   22          A11-1A09/1C09   22     5   A04A09                 A

      A07-1A10/1C10   11          A05-1A10/1C10   11     4   A04A10                 A
      A07-1A10/1C10   22          A11-1A10/1C10   22     5   A04A10                 A

      A07-1A11/1C11   11          A05-1A11/1C11   11     4   A04A11                 A
      A07-1A11/1C11   22          A11-1A11/1C11   22     5   A04A11                 A

      A07-1A12/1C12   11          A05-1A12/1C12   11     4   A04A12                 A
      A07-1A12/1C12   22          A12-1A08/1C08   22     6   A04A12                 A

      A07-1A13/1C13   11          A05-1A13/1C13   11     4   A04A13                 A
      A07-1A13/1C13   22          A12-1A09/1C09   22     6   A04A13                 A

      A07-1A14/1C14   11          A05-1A14/1C14   11     4   A04A14                 A
      A07-1A14/1C14   22          A12-1A10/1C10   22     6   A04A14                 A

      A07-1A15/1C15   11          A05-1A15/1C15   11     4   A04A15                 A
      A07-1A15/1C15   22          A12-1A11/1C11   22     6   A04A15                 A

      A07-1A16/1C16   11          A05-1A16/1C16   11     4   A04A16                 A
      A07-1A16/1C16   22          A11-1A16/1C16   22     5   A04A16                 A

      A07-1A17/1C17   11          A08-2A28/2C28   11     9   A08A78                 A

      A07-1A18/1C18   11          A08-2A27/2C27   11     9   A08A77                 A

      A07-1A19/1C19   11          A08-2A30/2C30   11     9   A08A80                 A

      A07-1A20/1C20   11          A08-2B30/2D30   11     9   A08B80                 A

      A07-1A22/1C22   11          A13-1A09/1C09   11     6   A07A22                 A

      A07-1A24/1C24   11          A13-1A28/1C28   11     6   A07A24                 A

      A07-1A25/1C25   11          A13-1A29/1C29   11     6   A07A25                 A

      A07-1A26/1C26   11          A13-1A31/1C31   11     6   A07A26                 A

      A07-1A27/1C27   11          A13-1A32/1C32   11     6   A07A27                 A

      A07-1A28/1C28   11          A13-1A33/1C33   11     6   A07A28                 A
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PAGE    29  PACK        A07                                                                                   DATE 87/05/22.
     ORIGIN        LEVS     DESTINATION     LEVS  LTH   SIGNAL  CBL COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A07-1A29/1C29  11         A08-2B25/2D25 11      8  A08B75                A

     A07-1A30/1C30  11         A08-2B26/2D26 11      8  A08B76                A

     A07-1A31/1C31  11         A08-2B27/2D27 11      8  A08B77                A

     A07-1A34/1C34  11         A04-1B40/1D40 11      4  A07A34                A

     A07-1A37/1C37  11         A09-2A26/2C26 11      7  A09A76                A

     A07-1A38/1C38  11         A04-2A22/2C22 11      7  A07A38                A

     A07-1A40/1C40  11         A10-2B25/2D25 11      7  A07A40                A

     A07-1B03/1D03  11         A04-2B14/2D14 11     13  A04B64                A

     A07-1B04/1D04  11         A08-2B31/2D31 11     11  A08B81                A

     A07-1B05/1D05  11         A04-1B05/1D05 11     13  A04B05                A

     A07-1B07/1D07  11         A08-2B33/2D33 11     11  A08B83                A

     A07-1B08/1D08  11         A05-1B08/1D08 11      4  A04B08                A
     A07-1B08/1D08  22         A11-1B08/1D08 22      5  A04B08                A

     A07-1B09/1D09  11         A05-1B09/1D09 11      4  A04B09                A
     A07-1B09/1D09  22         A11-1B09/1D09 22      5  A04B09                A

     A07-1B10/1D10  11         A05-1B10/1D10 11      4  A04B10                A
     A07-1B10/1D10  22         A11-1B10/1D10 22      5  A04B10                A

     A07-1B11/1D11  11         A05-1B11/1D11 11      4  A04B11                A
     A07-1B11/1D11  22         A11-1B11/1D11 22      5  A04B11                A

     A07-1B12/1D12  11         A05-1B12/1D12 11      4  A04B12                A
     A07-1B12/1D12  22         A12-1B08/1D08 22      6  A04B12                A

     A07-1B13/1D13  11         A05-1B13/1D13 11      4  A04B13                A
     A07-1B13/1D13  22         A12-1B09/1D09 22      6  A04B13                A

     A07-1B14/1D14  11         A05-1B14/1D14 11      4  A04B14                A
     A07-1B14/1D14  22         A12-1B10/1D10 22      6  A04B14                A

     A07-1B15/1D15  11         A05-1B15/1D15 11      4  A04B15                A
     A07-1B15/1D15  22         A12-1B11/1D11 22      6  A04B15                A

     A07-1B16/1D16  11         A05-1B16/1D16 11      4  A04B16                A
     A07-1B16/1D16  22         A12-1A16/1C16 22      5  A04B16                A

     A07-1B17/1D17  11         A08-2B28/2D28 11      9  A08B78                A

     A07-1B18/1D18  11         A08-2B29/2D29 11      9  A08B79                A

     A07-1B19/1D19  11         A08-2A29/2C29 11      9  A08A79                A
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PAGE 30 PACK A07 DATE 87/05/22.

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A07-1B20/1D20	11	A08-1A43/1C43	11	5	A08A43			A				
A07-1B21/1D21	11	A10-1B24/1D24	11	4	A12A88			A				
A07-1B22/1D22	11	A09-2A34/2C34	11	9	A12A13			A				
A07-1B24/1D24	11	A10-1B21/1D21	11	4	A07B24			A				
A07-1B25/1D25	11	A10-1B22/1D22	11	4	A07B25			A				
A07-1B26/1D26	11	A13-1A16/1C16	11	6	A07B26			A				
A07-1B27/1D27	11	A13-1A17/1C17	11	6	A07B27			A				
A07-1B28/1D28	11	A13-1A18/1C18	11	6	A07B28			A				
A07-1B29/1D29	11	A08-2A26/2C26	11	8	A08A76			A				
A07-1B30/1D30	11	A13-1A34/1C34	11	6	A07B30			A				
A07-1B31/1D31	11	A03-2B25/2D25	11	8	A03B75			A				
A07-1B33/1D33	11	A10-2B34/2D34	11	8	A07B33			A				
A07-1B37/1D37	11	A14-2A11/2C11	11	7	A07B37			A				
A07-1B38/1D38	11	A11-1B12/1D12	11	6	A07B38			A				
A07-2A15/2C15	11	A08-1A32/1C32	11	6	A08A32			A				
A07-2A34/2C34	11	A05-2A34/2C34	11	4	A04A84			A				
A07-2A34/2C34	22	A08-2A34/2C34	22	3	A04A84			A				
A07-2A35/2C35	11	A08-2A35/2C35	11	3	A03A85			A				
A07-2A35/2C35	22	A05-2A35/2C35	22	4	A03A85			A				
A07-2A36/2C36	11	A08-2A36/2C36	11	3	A03A86			A				
A07-2A36/2C36	22	A05-2A36/2C36	22	4	A03A86			A				
A07-2A37/2C37	11	A08-2A37/2C37	11	3	A03A87			A				
A07-2A37/2C37	22	A05-2A37/2C37	22	4	A03A87			A				
A07-2A38/2C38	11	A08-2A38/2C38	11	3	A03A88			A				
A07-2A38/2C38	22	A05-2A38/2C38	22	4	A03A88			A				
A07-2A40/2C40	11	A08-2A40/2C40	11	3	A03A90			A				
A07-2A40/2C40	22	A05-2A40/2C40	22	4	A03A90			A				
A07-2A41/2C41	11	A08-2A41/2C41	11	3	A03A91			A				
A07-2A41/2C41	22	A05-2A41/2C41	22	4	A03A91			A				
A07-2A42/2C42	11	A08-2A42/2C42	11	3	A03A92			A				
A07-2A42/2C42	22	A05-2A42/2C42	22	4	A03A92			A				

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PAGE    31  PACK       A07                                                                                    DATE 87/05/22.
     ORIGIN         LEVS       DESTINATION     LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE


     A07-2A43/2C43   11          A08-2A43/2C43  11     3   A03A93                A
     A07-2A43/2C43   22          A05-2A43/2C43  22     4   A03A93                A

     A07-2B05/2D05   11          A07-2B06/2D06  11     3   A07B05                A

     A07-2B06/2D06   11          A07-2B05/2D05  11     3   A07B05                A

     A07-2B15/2D15   11          A08-2B15/2D15  11     3   A08B65                A

     A07-2B33/2D33   11          A05-2B33/2D33  11     4   A04B83                A
     A07-2B33/2D33   22          A11-2B33/2D33  22     5   A04B83                A

     A07-2B34/2D34   11          A05-2B34/2D34  11     4   A04B84                A
     A07-2B34/2D34   22          A11-2B34/2D34  22     5   A04B84                A

     A07-2B35/2D35   11          A08-2B35/2D35  11     3   A03B85                A
     A07-2B35/2D35   22          A05-2B35/2D35  22     4   A03B85                A

     A07-2B36/2D36   11          A08-2B36/2D36  11     3   A03B86                A
     A07-2B36/2D36   22          A05-2B36/2D36  22     4   A03B86                A

     A07-2B37/2D37   11          A08-2B37/2D37  11     3   A03B87                A
     A07-2B37/2D37   22          A05-2B37/2D37  22     4   A03B87                A

     A07-2B38/2D38   11          A08-2B38/2D38  11     3   A03B88                A
     A07-2B38/2D38   22          A05-2B38/2D38  22     4   A03B88                A

     A07-2B40/2D40   11          A08-2B40/2D40  11     3   A03B90                A
     A07-2B40/2D40   22          A05-2B40/2D40  22     4   A03B90                A

     A07-2B41/2D41   11          A08-2B41/2D41  11     3   A03B91                A
     A07-2B41/2D41   22          A05-2B41/2D41  22     4   A03B91                A

     A07-2B42/2D42   11          A08-2B42/2D42  11     3   A03B92                A
     A07-2B42/2D42   22          A05-2B42/2D42  22     4   A03B92                A

     A07-2B43/2D43   11          A08-2B43/2D43  11     3   A03B93                A
     A07-2B43/2D43   22          A05-2B43/2D43  22     4   A03B93                A
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PAGE     32  PACK        A08                                                                                       DATE 87/05/22.
     ORIGIN         LEVS       DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A08-1A03/1C03  11           A04-2B26/2D26  11     13   A04B76                A
     A08-1A04/1C04  11           A04-2A11/2C11  11     13   A04A61                A
     A08-1A05/1C05  11           A10-1A27/1C27  11      5   A08A05                A
     A08-1A17/1C17  11           A13-1B21/1D21  11      6   A08A17                A
     A08-1A21/1C21  11           A09-1B33/1D33  11      4   A09B33                A
     A08-1A22/1C22  11           A10-2A22/2C22  11      8   A11A64                A
     A08-1A24/1C24  11           A09-1A24/1C24  11      3   A09A24                A
     A08-1A25/1C25  11           A09-1A25/1C25  11      3   A09A25                A
     A08-1A26/1C26  11           A09-1A26/1C26  11      3   A09A26                A
     A08-1A27/1C27  11           A09-1A27/1C27  11      3   A09A27                A
     A08-1A28/1C28  11           A09-1A28/1C28  11      3   A09A28                A
     A08-1A29/1C29  11           A09-1A29/1C29  11      3   A09A29                A
     A08-1A30/1C30  11           A09-1A30/1C30  11      3   A09A30                A
     A08-1A31/1C31  11           A09-1A31/1C31  11      3   A09A31                A
     A08-1A32/1C32  11           A07-2A15/2C15  11      6   A08A32                A
     A08-1A33/1C33  11           A09-1B37/1D37  11      3   A09B37                A
     A08-1A33/1C33  22           A11-2B16/2D16  22      7   A09B37                A
     A08-1A34/1C34  11           A13-1B30/1D30  11      6   A08A34                A
     A08-1A35/1C35  11           A11-2B32/2D32  11      8   A08A35                A
     A08-1A36/1C36  11           A09-1A41/1C41  11      3   A09A41                A
     A08-1A36/1C36  22           A11-2B17/2D17  22      7   A09A41                A
     A08-1A37/1C37  11           A09-1A42/1C42  11      3   A09A42                A
     A08-1A37/1C37  22           A11-2B18/2D18  22      7   A09A42                A
     A08-1A38/1C38  11           A11-2A18/2C18  11      7   A08A38                A
     A08-1A40/1C40  11           A10-2B24/2D24  11      7   A02B79                A
     A08-1A40/1C40  22           A04-2B04/2D04  22      5   A02B79                A
     A08-1A42/1C42  11           A09-1B42/1D42  11      3   A09B42                A
     A08-1A43/1C43  11           A07-1B20/1D20  11      5   A08A43                A
     A08-1B03/1D03  11           A04-2A16/2C16  11     13   A04A66                A
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PAGE    33  PACK       A08                                                                                          DATE 87/05/22.
         ORIGIN        LEVS       DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

         A08-1B04/1D04  11          A10-1B35/1D35   11     6    A10B35                 A

         A08-1B05/1D05  11          A04-2A29/2C29   11    13    A04A79                 A        F
         A08-1B05/1D05  22          A11-1B05/1D05   22     3    A04A79                 A        F

         A08-1B07/1D07  11          A09-2B25/2D25   11    10    A09B75                 A

         A08-1B08/1D08  11          A10-2A07/2C07   11     8    A08B08                 A

         A08-1B17/1D17  11          A11-1A42/1C42   11     5    A08B17                 A

         A08-1B21/1D21  11          A10-1A42/1C42   11     5    A10A42                 A

         A08-1B24/1D24  11          A09-1B24/1D24   11     3    A09B24                 A

         A08-1B25/1D25  11          A09-1B25/1D25   11     3    A09B25                 A

         A08-1B26/1D26  11          A09-1B26/1D26   11     3    A09B26                 A

         A08-1B27/1D27  11          A09-1B27/1D27   11     3    A09B27                 A

         A08-1B28/1D28  11          A09-1B28/1D28   11     3    A09B28                 A

         A08-1B29/1D29  11          A09-1B29/1D29   11     3    A09B29                 A

         A08-1B30/1D30  11          A09-1B30/1D30   11     3    A09B30                 A

         A08-1B31/1D31  11          A09-1B31/1D31   11     3    A09B31                 A

         A08-1B33/1D33  11          A11-1A13/1C13   11     5    A11A13.                A

         A08-1B34/1D34  11          A13-1B33/1D33   11     6    A08B34                 A

         A08-1B35/1D35  11          A04-2B08/2D08   11     6    A08B35                 A

         A08-1B36/1D36  11          A09-1B41/1D41   11     3    A09B41                 A
         A08-1B36/1D36  22          A11-2A17/2C17   22     7    A09B41                 A

         A08-1B37/1D37  11          A02-2B19/2D19   11     8    A08B37                 A

         A08-1B38/1D38  22          A05-2B20/2D20   22     7    A08B38                 A

         A08-1B40/1D40  11          A10-2A41/2C41   11     8    A08B40                 A

         A08-1B41/1D41  11          A09-1A38/1C38   11     3    A09A38                 A

         A08-1B42/1D42  11          A09-2B05/2D05   11     4    A09B55                 A

         A08-1B43/1D43  11          A09-1A34/1C34   11     3    A09A34                 A

         A08-2A03/2C03  11          A13-2A41/2C41   11     7    A08A53                 A

         A08-2A04/2C04  11          A13-2B33/2D33   11     7    A08A54                 A
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PAGE     34  PACK        A08                                                                              DATE 87/05/22.
     ORIGIN          LEVS       DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A08-2A05/2C05   11          A10-2A25/2C25   11     5    A08A55                 A
     A08-2A07/2C07   11          A09-2A07/2C07   11     3    A09A57                 A
     A08-2A08/2C08   11          A09-2A08/2C08   11     3    A09A58                 A
     A08-2A09/2C09   11          A09-2A09/2C09   11     3    A09A59                 A
     A08-2A10/2C10   11          A09-2A10/2C10   11     3    A09A60                 A
     A08-2A11/2C11   11          A09-2A11/2C11   11     3    A09A61                 A
     A08-2A12/2C12   11          A09-2A12/2C12   11     3    A09A62                 A
     A08-2A13/2C13   11          A09-2A13/2C13   11     3    A09A63                 A
     A08-2A14/2C14   11          A09-2A14/2C14   11     3    A09A64                 A
     A08-2A16/2C16   11          A10-1A22/1C22   11     8    A10A22                 A
     A08-2A17/2C17   11          A02-1B36/1D36   11     8    A02B36                 A
     A08-2A26/2C26   11          A07-1B29/1D29   11     8    A08A76                 A
     A08-2A27/2C27   11          A07-1A18/1C18   11     9    A08A77                 A
     A08-2A28/2C28   11          A07-1A17/1C17   11     9    A08A78                 A
     A08-2A29/2C29   11          A07-1B19/1D19   11     9    A08A79                 A
     A08-2A30/2C30   11          A07-1A19/1C19   11     9    A08A80                 A
     A08-2A31/2C31   11          A07-1A03/1C03   11    11    A08A81                 A
     A08-2A32/2C32   11          A02-1A20/1C20   11    10    A08A82                 A
     A08-2A33/2C33   11          A10-2B41/2D41   11     4    A08A83                 A

     A08-2A34/2C34   11          A11-2A34/2C34   11     4    A04A84                 A
     A08-2A34/2C34   22          A07-2A34/2C34   22     3    A04A84                 A

     A08-2A35/2C35   11          A07-2A35/2C35   11     3    A03A85                 A
     A08-2A35/2C35   22          A09-2A35/2C35   22     3    A03A85                 A

     A08-2A36/2C36   11          A07-2A36/2C36   11     3    A03A86                 A
     A08-2A36/2C36   22          A09-2A36/2C36   22     3    A03A86                 A

     A08-2A37/2C37   11          A07-2A37/2C37   11     3    A03A87                 A
     A08-2A37/2C37   22          A09-2A37/2C37   22     3    A03A87                 A

     A08-2A38/2C38   11          A07-2A38/2C38   11     3    A03A88                 A
     A08-2A38/2C38   22          A09-2A38/2C38   22     3    A03A88                 A
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ORIGIN          LEVS      DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

A08-2A40/2C40   11        A07-2A40/2C40    11     3    A03A90                A
A08-2A40/2C40   22        A09-2A40/2C40    22     3    A03A90                A

A08-2A41/2C41   11        A07-2A41/2C41    11     3    A03A91                A
A08-2A41/2C41   22        A09-2A41/2C41    22     3    A03A91                A

A08-2A42/2C42   11        A07-2A42/2C42    11     3    A03A92                A
A08-2A42/2C42   22        A09-2A42/2C42    22     3    A03A92                A

A08-2A43/2C43   11        A07-2A43/2C43    11     3    A03A93                A
A08-2A43/2C43   22        A09-2A43/2C43    22     3    A03A93                A

A08-2B03/2D03   11        A13-2B43/2D43    11     7    A08B53                A

A08-2B04/2D04   22        A04-2B15/2D15    22     5    A08B54                A

A08-2B07/2D07   11        A09-2B07/2D07    11     3    A09B57                A

A08-2B08/2D08   11        A09-2B08/2D08    11     3    A09B58                A

A08-2B09/2D09   11        A09-2B09/2D09    11     3    A09B59                A

A08-2B10/2D10   11        A09-2B10/2D10    11     3    A09B60                A

A08-2B11/2D11   11        A09-2B11/2D11    11     3    A09B61                A

A08-2B12/2D12   11        A09-2B12/2D12    11     3    A09B62                A

A08-2B13/2D13   11        A09-2B13/2D13    11     3    A09B63                A

A08-2B14/2D14   11        A09-2B14/2D14    11     3    A09B64                A

A08-2B15/2D15   11        A07-2B15/2D15    11     3    A08B65                A

A08-2B16/2D16   11        A04-2A09/2C09    11     5    A03B84                A

A08-2B25/2D25   11        A07-1A29/1C29    11     8    A08B75                A

A08-2B26/2D26   11        A07-1A30/1C30    11     8    A08B76                A

A08-2B27/2D27   11        A07-1A31/1C31    11     8    A08B77                A

A08-2B28/2D28   11        A07-1B17/1D17    11     9    A08B78                A

A08-2B29/2D29   11        A07-1B18/1D18    11     9    A08B79                A

A08-2B30/2D30   11        A07-1A20/1C20    11     9    A08B80                A

A08-2B31/2D31   11        A07-1B04/1D04    11    11    A08B81                A

A08-2B32/2D32   11        A07-1A05/1C05    11    11    A08B82                A

A08-2B33/2D33   11        A07-1B07/1D07    11    11    A08B83                A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ---------- QSE
A08-2B34/2D34	11	A11-1A12/1C12	11	10	A08B84			A		
A08-2B35/2D35	11	A07-2B35/2D35	11	3	A03B85			A		
A08-2B35/2D35	22	A09-2B35/2D35	22	3	A03B85			A		
A08-2B36/2D36	11	A07-2B36/2D36	11	3	A03B86			A		
A08-2B36/2D36	22	A09-2B36/2D36	22	3	A03B86			A		
A08-2B37/2D37	11	A07-2B37/2D37	11	3	A03B87			A		
A08-2B37/2D37	22	A09-2B37/2D37	22	3	A03B87			A		
A08-2B38/2D38	11	A07-2B38/2D38	11	3	A03B88			A		
A08-2B38/2D38	22	A09-2B38/2D38	22	3	A03B88			A		
A08-2B40/2D40	11	A07-2B40/2D40	11	3	A03B90			A		
A08-2B40/2D40	22	A09-2B40/2D40	22	3	A03B90			A		
A08-2B41/2D41	11	A07-2B41/2D41	11	3	A03B91			A		
A08-2B41/2D41	22	A09-2B41/2D41	22	3	A03B91			A		
A08-2B42/2D42	11	A07-2B42/2D42	11	3	A03B92			A		
A08-2B42/2D42	22	A09-2B42/2D42	22	3	A03B92			A		
A08-2B43/2D43	11	A07-2B43/2D43	11	3	A03B93			A		
A08-2B43/2D43	22	A09-2B43/2D43	22	3	A03B93			A		

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PAGE    37  PACK        A09                                                                                            DATE 87/05/22.
     ORIGIN        LEVS      DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A09-1A12/1C12  11        A11-1B18/1D18  11     4   A11B18                 A

     A09-1A13/1C13  11        A09-1B34/1D34  11     5   A09B34                 A

     A09-1A24/1C24  11        A08-1A24/1C24  11     3   A09A24                 A
     A09-1A24/1C24  22        A11-1A24/1C24  22     4   A09A24                 A

     A09-1A25/1C25  11        A08-1A25/1C25  11     3   A09A25                 A
     A09-1A25/1C25  22        A11-1A25/1C25  22     4   A09A25                 A

     A09-1A26/1C26  11        A08-1A26/1C26  11     3   A09A26                 A
     A09-1A26/1C26  22        A11-1A26/1C26  22     4   A09A26                 A

     A09-1A27/1C27  11        A08-1A27/1C27  11     3   A09A27                 A
     A09-1A27/1C27  22        A11-1A27/1C27  22     4   A09A27                 A

     A09-1A28/1C28  11        A08-1A28/1C28  11     3   A09A28                 A
     A09-1A28/1C28  22        A12-1A24/1C24  22     4   A09A28                 A

     A09-1A29/1C29  11        A08-1A29/1C29  11     3   A09A29                 A
     A09-1A29/1C29  22        A12-1A25/1C25  22     4   A09A29                 A

     A09-1A30/1C30  11        A08-1A30/1C30  11     3   A09A30                 A
     A09-1A30/1C30  22        A12-1A26/1C26  22     4   A09A30                 A

     A09-1A31/1C31  11        A08-1A31/1C31  11     3   A09A31                 A
     A09-1A31/1C31  22        A12-1A27/1C27  22     4   A09A31                 A

     A09-1A32/1C32  11        A11-1A07/1C07  11     5   A11A07                 A

     A09-1A34/1C34  11        A08-1B43/1D43  11     3   A09A34                 A

     A09-1A35/1C35  11        A13-1A22/1C22  11     5   A09A35                 A

     A09-1A38/1C38  11        A08-1B41/1D41  11     3   A09A38                 A

     A09-1A40/1C40  11        A11-1B41/1D41  11     4   A09A40                 A

     A09-1A41/1C41  11        A08-1A36/1C36  11     3   A09A41                 A

     A09-1A42/1C42  11        A08-1A37/1C37  11     3   A09A42                 A

     A09-1A43/1C43  11        A10-2B40/2D40  11     8   A09A43                 A

     A09-1B03/1D03  11        A09-2B27/2D27  11    10   A09B77                 A

     A09-1B24/1D24  11        A08-1B24/1D24  11     3   A09B24                 A
     A09-1B24/1D24  22        A11-1B24/1D24  22     4   A09B24                 A

     A09-1B25/1D25  11        A08-1B25/1D25  11     3   A09B25                 A
     A09-1B25/1D25  22        A11-1B25/1D25  22     4   A09B25                 A

     A09-1B26/1D26  11        A08-1B26/1D26  11     3   A09B26                 A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A09-1B26/1D26	22	A11-1B26/1D26	22	4	A09B26			A				
A09-1B27/1D27	11	A08-1B27/1D27	11	3	A09B27			A				
A09-1B27/1D27	22	A11-1B27/1D27	22	4	A09B27			A				
A09-1B28/1D28	11	A08-1B28/1D28	11	3	A09B28			A				
A09-1B28/1D28	22	A12-1B24/1D24	22	4	A09B28			A				
A09-1B29/1D29	11	A08-1B29/1D29	11	3	A09B29			A				
A09-1B29/1D29	22	A12-1B25/1D25	22	4	A09B29			A				
A09-1B30/1D30	11	A08-1B30/1D30	11	3	A09B30			A				
A09-1B30/1D30	22	A12-1B26/1D26	22	4	A09B30			A				
A09-1B31/1D31	11	A08-1B31/1D31	11	3	A09B31			A				
A09-1B31/1D31	22	A12-1B27/1D27	22	4	A09B31			A				
A09-1B33/1D33	11	A08-1A21/1C21	11	4	A09B33			A				
A09-1B34/1D34	11	A09-1A13/1C13	11	5	A09B34			A				
A09-1B35/1D35	11	A11-1A35/1C35	11	3	A09B35			A				
A09-1B37/1D37	11	A08-1A33/1C33	11	3	A09B37			A				
A09-1B38/1D38	11	A12-1B41/1D41	11	4	A09B38			A				
A09-1B41/1D41	11	A08-1B36/1D36	11	3	A09B41			A				
A09-1B42/1D42	11	A08-1A42/1C42	11	3	A09B42			A				
A09-1B42/1D42	22	A10-2A40/2C40	22	8	A09B42			A				
A09-2A03/2C03	11	A11-1A21/1C21	11	6	A11A21			A				
A09-2A05/2C05	11	A10-2B08/2D08	11	3	A09A55			A				
A09-2A07/2C07	11	A08-2A07/2C07	11	3	A09A57			A				
A09-2A07/2C07	22	A11-2A07/2C07	22	4	A09A57			A				
A09-2A08/2C08	11	A08-2A08/2C08	11	3	A09A58			A				
A09-2A08/2C08	22	A11-2A08/2C08	22	4	A09A58			A				
A09-2A09/2C09	11	A08-2A09/2C09	11	3	A09A59			A				
A09-2A09/2C09	22	A11-2A09/2C09	22	4	A09A59			A				
A09-2A10/2C10	11	A08-2A10/2C10	11	3	A09A60			A				
A09-2A10/2C10	22	A11-2A10/2C10	22	4	A09A60			A				
A09-2A11/2C11	11	A08-2A11/2C11	11	3	A09A61			A				
A09-2A11/2C11	22	A12-2A07/2C07	22	4	A09A61			A				
A09-2A12/2C12	11	A08-2A12/2C12	11	3	A09A62			A				
A09-2A12/2C12	22	A12-2A08/2C08	22	4	A09A62			A				

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PAGE    39 PACK        A09                                                                                              DATE 87/05/22.
     ORIGIN        LEVS      DESTINATION     LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A09-2A13/2C13  11         A08-2A13/2C13  11     3    A09A63                 A
     A09-2A13/2C13  22         A12-2A09/2C09  22     4    A09A63                 A

     A09-2A14/2C14  11         A08-2A14/2C14  11     3    A09A64                 A
     A09-2A14/2C14  22         A12-2A10/2C10  22     4    A09A64                 A

     A09-2A17/2C17  11         A11-2A13/2C13  11     4    A11A63                 A

     A09-2A20/2C20  11         A11-2B03/2D03  11     5    A09A70                 A

     A09-2A21/2C21  11         A11-2B13/2D13  11     4    A09A71                 A

     A09-2A22/2C22  11         A11-2B15/2D15  11     4    A09A72                 A

     A09-2A24/2C24  11         A13-2A43/2C43  11     6    A09A74                 A

     A09-2A25/2C25  11         A13-2B20/2D20  11     5    A09A75                 A

     A09-2A26/2C26  11         A07-1A37/1C37  11     7    A09A76                 A

     A09-2A27/2C27  11         A11-2B36/2D36  11     4    A09A77                 A

     A09-2A33/2C33  11         A13-1A21/1C21  11    10    A09A83                 A

     A09-2A34/2C34  11         A07-1B22/1D22  11     9    A12A13                 A
     A09-2A34/2C34  22         A10-2A03/2C03  22     6    A12A13                 A

     A09-2A35/2C35  11         A14-2A35/2C35  11     5    A03A85                 A
     A09-2A35/2C35  22         A08-2A35/2C35  22     3    A03A85                 A

     A09-2A36/2C36  11         A14-2A36/2C36  11     5    A03A86                 A
     A09-2A36/2C36  22         A08-2A36/2C36  22     3    A03A86                 A

     A09-2A37/2C37  11         A14-2A37/2C37  11     5    A03A87                 A
     A09-2A37/2C37  22         A08-2A37/2C37  22     3    A03A87                 A

     A09-2A38/2C38  11         A14-2A38/2C38  11     5    A03A88                 A
     A09-2A38/2C38  22         A08-2A38/2C38  22     3    A03A88                 A

     A09-2A40/2C40  11         A14-2A40/2C40  11     5    A03A90                 A
     A09-2A40/2C40  22         A08-2A40/2C40  22     3    A03A90                 A

     A09-2A41/2C41  11         A14-2A41/2C41  11     5    A03A91                 A
     A09-2A41/2C41  22         A08-2A41/2C41  22     3    A03A91                 A

     A09-2A42/2C42  11         A14-2A42/2C42  11     5    A03A92                 A
     A09-2A42/2C42  22         A08-2A42/2C42  22     3    A03A92                 A

     A09-2A43/2C43  11         A14-2A43/2C43  11     5    A03A93                 A
     A09-2A43/2C43  22         A08-2A43/2C43  22     3    A03A93                 A

     A09-2B05/2D05  11         A08-1B42/1D42  11     4    A09B55                 A
     A09-2B05/2D05  22         A11-1A41/1C41  22     5    A09B55                 A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ---------- QSE
A09-2B07/2D07	11	A08-2B07/2D07	11	3	A09B57			A		
A09-2B07/2D07	22	A11-2B07/2D07	22	4	A09B57			A		
A09-2B08/2D08	11	A08-2B08/2D08	11	3	A09B58			A		
A09-2B08/2D08	22	A11-2B08/2D08	22	4	A09B58			A		
A09-2B09/2D09	11	A08-2B09/2D09	11	3	A09B59			A		
A09-2B09/2D09	22	A11-2B09/2D09	22	4	A09B59			A		
A09-2B10/2D10	11	A08-2B10/2D10	11	3	A09B60			A		
A09-2B10/2D10	22	A11-2B10/2D10	22	4	A09B60			A		
A09-2B11/2D11	11	A08-2B11/2D11	11	3	A09B61			A		
A09-2B11/2D11	22	A12-2B07/2D07	22	4	A09B61			A		
A09-2B12/2D12	11	A08-2B12/2D12	11	3	A09B62			A		
A09-2B12/2D12	22	A12-2B08/2D08	22	4	A09B62			A		
A09-2B13/2D13	11	A08-2B13/2D13	11	3	A09B63			A		
A09-2B13/2D13	22	A12-2B09/2D09	22	4	A09B63			A		
A09-2B14/2D14	11	A08-2B14/2D14	11	3	A09B64			A		
A09-2B14/2D14	22	A12-2B10/2D10	22	4	A09B64			A		
A09-2B19/2D19	11	A02-2A21/2C21	11	7	A09B69			A		
A09-2B19/2D19	22	A04-1A22/1C22	22	9	A09B69			A		
A09-2B20/2D20	11	A11-1B42/1D42	11	6	A09B70			A		
A09-2B21/2D21	11	A13-2B11/2D11	11	5	A09B71			A		
A09-2B22/2D22	11	A10-1A41/1C41	11	6	A09B72			A		
A09-2B24/2D24	11	A13-2B17/2D17	11	5	A09B74			A		
A09-2B25/2D25	11	A08-1B07/1D07	11	10	A09B75			A		
A09-2B26/2D26	11	A13-2B35/2D35	11	5	A09B76			A		
A09-2B27/2D27	11	A09-1B03/1D03	11	10	A09B77			A		
A09-2B31/2D31	11	A06-2B31/2D31	11	4	A04B81			A		
A09-2B31/2D31	22	A11-2B31/2D31	22	4	A04B81			A		
A09-2B33/2D33	11	A13-1B22/1D22	11	10	A09B83			A		
A09-2B34/2D34	11	A13-2B36/2D36	11	5	A09B84			A		
A09-2B35/2D35	11	A14-2B35/2D35	11	5	A03B85			A		
A09-2B35/2D35	22	A08-2B35/2D35	22	3	A03B85			A		
A09-2B36/2D36	11	A14-2B36/2D36	11	5	A03B86			A		
A09-2B36/2D36	22	A08-2B36/2D36	22	3	A03B86			A		

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PAGE     41  PACK         A09                                                                                                   DATE 87/05/22.
     ORIGIN          LEVS       DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A09-2B37/2D37   11           A14-2B37/2D37  11     5     A03B87                A
     A09-2B37/2D37   22           A08-2B37/2D37  22     3     A03B87                A

     A09-2B38/2D38   11           A14-2B38/2D38  11     5     A03B88                A
     A09-2B38/2D38   22           A08-2B38/2D38  22     3     A03B88                A

     A09-2B40/2D40   11           A14-2B40/2D40  11     5     A03B90                A
     A09-2B40/2D40   22           A08-2B40/2D40  22     3     A03B90                A

     A09-2B41/2D41   11           A14-2B41/2D41  11     5     A03B91                A
     A09-2B41/2D41   22           A08-2B41/2D41  22     3     A03B91                A

     A09-2B42/2D42   11           A14-2B42/2D42  11     5     A03B92                A
     A09-2B42/2D42   22           A08-2B42/2D42  22     3     A03B92                A

     A09-2B43/2D43   11           A14-2B43/2D43  11     5     A03B93                A
     A09-2B43/2D43   22           A08-2B43/2D43  22     3     A03B93                A
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PAGE    42  PACK        A10                                                                                      DATE 87/05/22.
     ORIGIN         LEVS      DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE --------- DESCRIPTION ----------- QSE

     A10-1A07/1C07  11          A04-1A07/1C07  11    13    A04A07                A        F

     A10-1A21/1C21  11          A11-1A31/1C31  11     4    A11A31                A

     A10-1A22/1C22  11          A08-2A16/2C16  11     8    A10A22                A

     A10-1A27/1C27  11          A08-1A05/1C05  11     5    A08A05                A

     A10-1A32/1C32  11          A13-1A30/1C30  11     4    A10A32                A

     A10-1A33/1C33  11          A11-1A43/1C43  11     4    A11A43                A

     A10-1A36/1C36  11          A11-1B43/1D43  11     4    A11B43                A

     A10-1A40/1C40  11          A11-2A40/2C40  11     8    A11A90                A

     A10-1A41/1C41  11          A09-2B22/2D22  11     6    A09B72                A

     A10-1A42/1C42  11          A08-1B21/1D21  11     5    A10A42                A
     A10-1A42/1C42  22          A11-1A22/1C22  22     5    A10A42                A

     A10-1B05/1D05  11          A04-1A37/1C37  11    13    A04A37                A

     A10-1B21/1D21  11          A07-1B24/1D24  11     4    A07B24                A

     A10-1B22/1D22  11          A07-1B25/1D25  11     4    A07B25                A

     A10-1B24/1D24  11          A07-1B21/1D21  11     4    A12A88                A
     A10-1B24/1D24  22          A12-2A38/2C38  22    10    A12A88                A

     A10-1B25/1D25  11          A13-2B31/2D31  11     9    A10B25                A

     A10-1B26/1D26  11          A12-2A31/2C31  11     9    A10B26                A

     A10-1B32/1D32  11          A11-2A15/2C15  11     6    A11A65                A

     A10-1B35/1D35  11          A08-1B04/1D04  11     6    A10B35                A

     A10-1B36/1D36  11          A11-1B38/1D38  11     3    A11B38                A

     A10-1B40/1D40  11          A11-1A28/1C28  11     4    A11A83                A

     A10-1B43/1D43  11          A11-2B14/2D14  11     5    A10B43                A

     A10-2A03/2C03  11          A12-1A13/1C13  11     7    A12A13                A
     A10-2A03/2C03  22          A09-2A34/2C34  22     6    A12A13                A

     A10-2A04/2C04  11          A13-1A12/1C12  11     8    A10A54                A

     A10-2A07/2C07  11          A08-1B08/1D08  11     8    A08B08                A

     A10-2A08/2C08  11          A13-1B13/1D13  11     8    A13B13                A
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PAGE 43 PACK A10 DATE 87/05/22.

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A10-2A09/2C09	11	A11-2A30/2C30	11	5	A11A80			A		
A10-2A10/2C10	11	A12-1B26/1D26	11	7	A09B30			A		
A10-2A11/2C11	11	A11-1A38/1C38	11	5	A11A38			A		
A10-2A12/2C12	11	A11-1A40/1C40	11	5	A10A62			A		
A10-2A13/2C13	11	A11-1A30/1C30	11	6	A11A30			A		
A10-2A14/2C14	11	A12-1B25/1D25	11	7	A09B29			A		
A10-2A15/2C15	11	A12-1B24/1D24	11	7	A09B28			A		
A10-2A16/2C16	11	A12-1B28/1D28	11	7	A12B28			A		
A10-2A17/2C17	11	A11-2B37/2D37	11	5	A11B87			A		
A10-2A18/2C18	11	A11-2A37/2C37	11	4	A11A87			A		
A10-2A19/2C19	11	A11-1A32/1C32	11	7	A11A32			A		
A10-2A22/2C22	11	A08-1A22/1C22	11	8	A11A64			A		
A10-2A22/2C22	22	A11-2A14/2C14	22	3	A11A64			A		
A10-2A25/2C25	11	A08-2A05/2C05	11	5	A08A55			A		
A10-2A25/2C25	22	A11-1B40/1D40	22	7	A08A55			A		
A10-2A26/2C26	22	A13-1B27/1D27	22	8	A09B27			A		
A10-2A27/2C27	22	A13-1B26/1D26	22	9	A09B26			A		
A10-2A28/2C28	11	A11-1B28/1D28	11	8	A11B28			A		
A10-2A29/2C29	11	A11-1A37/1C37	11	7	A11A37			A		
A10-2A30/2C30	11	A13-2A17/2C17	11	5	A13A67			A		
A10-2A31/2C31	22	A13-1B24/1D24	22	9	A09B24			A		
A10-2A32/2C32	22	A13-1A24/1C24	22	9	A09A24			A		
A10-2A33/2C33	11	A12-2B30/2D30	11	4	A12B80			A		
A10-2A35/2C35	11	A11-2A42/2C42	11	3	A11A92			A		
A10-2A36/2C36	11	A11-1A33/1C33	11	8	A10A86			A		
A10-2A37/2C37	11	A11-2A31/2C31	11	3	A10A87			A		
A10-2A38/2C38	11	A11-1B07/1D07	11	11	A11B07			A		
A10-2A40/2C40	22	A09-1B42/1D42	22	8	A09B42			A		

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A10-2A41/2C41	11	A08-1B40/1D40	11	8	A08B40			A		
A10-2A42/2C42	22	A13-1B21/1D21	22	10	A08A17			A		
A10-2A43/2C43	11	A13-2B12/2D12	11	6	A10A93			A		
A10-2B03/2D03	11	A11-2B38/2D38	11	6	A10B53			A		
A10-2B04/----		A10-2D04/----			GRNDXX			A		
A10-2B05/2D05	11	A11-2A32/2C32	11	5	A10B55			A		
A10-2B08/2D08	11	A09-2A05/2C05	11	3	A09A55			A		
A10-2B09/2D09	11	A12-1B27/1D27	11	6	A09B31			A		
A10-2B10/2D10	11	A12-1A27/1C27	11	7	A09A31			A		
A10-2B11/2D11	11	A12-1A26/1C26	11	7	A09A30			A		
A10-2B12/2D12	11	A11-2B40/2D40	11	5	A10B62			A		
A10-2B13/2D13	11	A11-2A43/2C43	11	6	A10B63			A		
A10-2B14/2D14	11	A11-1B30/1D30	11	7	A11B30			A		
A10-2B15/2D15	11	A12-1A25/1C25	11	7	A09A29			A		
A10-2B16/2D16	11	A12-1A24/1C24	11	7	A09A28			A		
A10-2B17/2D17	11	A11-2B30/2D30	11	4	A11B80			A		
A10-2B18/----		A10-2D18/----			GRNDXX			A		
A10-2B21/----		A10-2D21/----			GRNDXX			A		
A10-2B22/2D22	11	A13-2A05/2C05	11	5	A10B72			A		
A10-2B24/2D24	11	A08-1A40/1C40	11	7	A02B79			A		
A10-2B25/2D25	11	A07-1A40/1C40	11	7	A07A40			A		
A10-2B26/2D26	11	A04-1B32/1D32	11	9	A04B32			A		
A10-2B27/2D27	22	A13-1A27/1C27	22	8	A09A27			A		
A10-2B28/2D28	22	A13-1A26/1C26	22	9	A09A26			A		
A10-2B30/2D30	22	A13-1B25/1D25	22	9	A09B25			A		
A10-2B31/2D31	22	A13-1A25/1C25	22	9	A09A25			A		
A10-2B32/2D32	11	A13-2B13/2D13	11	5	A13B63			A		

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PAGE     45  PACK        A10                                                                                        DATE 87/05/22.
     ORIGIN          LEVS       DESTINATION       LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE
     A10-2B33/2D33   11          A13-2B03/2D03    11     6     A13B53                A
     A10-2B34/2D34   11          A07-1B33/1D33    11     8     A07B33                A
     A10-2B35/2D35   11          A11-2A41/2C41    11     3     A11A91                A
     A10-2B36/2D36   11          A11-1B33/1D33    11     8     A10B86                A
     A10-2B37/2D37   11          A11-1A29/1C29    11     9     A11A29                A
     A10-2B38/2D38   11          A13-1B35/1D35    11     9     A10B88                A
     A10-2B40/2D40   11          A09-1A43/1C43    11     8     A09A43                A
     A10-2B41/2D41   11          A08-2A33/2C33    11     4     A08A83                A
     A10-2B41/2D41   22          A11-2A16/2C16    22     5     A08A83                A
     A10-2B42/2D42   11          A13-2A12/2C12    11     6     A10B92                A
     A10-2B43/2D43   11          A13-1B18/1D18    11    11     A10B93                A
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PAGE    46 PACK        A11                                                            DATE 87/05/22.
    ORIGIN         LEVS   DESTINATION       LEVS LTH  SIGNAL CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

    A11-1A03/1C03  11        A04-2B27/2D27  11   13   A04B77               A

    A11-1A04/1C04  11        A04-2B11/2D11  11   13   A04B61               A

    A11-1A05/1C05  11        A04-2A33/2C33  11   13   A04A83               A        F
    A11-1A05/1C05  22        A12-1A05/1C05  22    3   A04A83               A        F

    A11-1A07/1C07  11        A09-1A32/1C32  11    5   A11A07               A

    A11-1A08/1C08  11        A14-1A08/1C08  11    4   A04A08               A
    A11-1A08/1C08  22        A07-1A08/1C08  22    5   A04A08               A

    A11-1A09/1C09  11        A14-1A09/1C09  11    4   A04A09               A
    A11-1A09/1C09  22        A07-1A09/1C09  22    5   A04A09               A

    A11-1A10/1C10  11        A14-1A10/1C10  11    4   A04A10               A
    A11-1A10/1C10  22        A07-1A10/1C10  22    5   A04A10               A

    A11-1A11/1C11  11        A14-1A11/1C11  11    4   A04A11               A
    A11-1A11/1C11  22        A07-1A11/1C11  22    5   A04A11               A

    A11-1A12/1C12  11        A08-2B34/2D34  11   10   A08B84               A
    A11-1A12/1C12  22        A12-1A12/1C12  22    3   A08B84               A

    A11-1A13/1C13  11        A08-1B33/1D33  11    5   A11A13               A

    A11-1A14/1C14  11        A11-1A19/1C19  11    3   A11A14               A

    A11-1A15/1C15  11        A13-2B26/2D26  11    9   A11A15               A

    A11-1A16/1C16  11        A14-1A16/1C16  11    4   A04A16               A
    A11-1A16/1C16  22        A07-1A16/1C16  22    5   A04A16               A

    A11-1A17/1C17  11        A13-2B34/2D34  11   10   A11A17               A

    A11-1A18/1C18  11        A13-2A27/2C27  11    9   A11A18               A

    A11-1A19/1C19  11        A11-1A14/1C14  11    3   A11A14               A

    A11-1A20/1C20  11        A13-2B30/2D30  11    9   A11A20               A

    A11-1A21/1C21  11        A09-2A03/2C03  11    6   A11A21               A

    A11-1A22/1C22  22        A10-1A42/1C42  22    5   A10A42               A

    A11-1A24/1C24  11        A13-1A24/1C24  11    4   A09A24               A
    A11-1A24/1C24  22        A09-1A24/1C24  22    4   A09A24               A

    A11-1A25/1C25  11        A13-1A25/1C25  11    4   A09A25               A
    A11-1A25/1C25  22        A09-1A25/1C25  22    4   A09A25               A

    A11-1A26/1C26  11        A13-1A26/1C26  11    4   A09A26               A
    A11-1A26/1C26  22        A09-1A26/1C26  22    4   A09A26               A
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PAGE 47 PACK A11 DATE 87/05/22.

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A11-1A27/1C27	11	A13-1A27/1C27	11	4	A09A27			A				
A11-1A27/1C27	22	A09-1A27/1C27	22	4	A09A27			A				
A11-1A28/1C28	11	A10-1B40/1D40	11	4	A11A83			A				
A11-1A28/1C28	22	A12-1A28/1C28	22	3	A11A83			A				
A11-1A29/1C29	11	A10-2B37/2D37	11	9	A11A29			A				
A11-1A30/1C30	11	A10-2A13/2C13	11	6	A11A30			A				
A11-1A31/1C31	11	A10-1A21/1C21	11	4	A11A31			A				
A11-1A32/1C32	11	A10-2A19/2C19	11	7	A11A32			A				
A11-1A33/1C33	11	A10-2A36/2C36	11	8	A10A86			A				
A11-1A35/1C35	11	A09-1B35/1D35	11	3	A09B35			A				
A11-1A35/1C35	22	A12-1A35/1C35	22	3	A09B35			A				
A11-1A36/1C36	11	A12-1A19/1C19	11	4	A11A36			A				
A11-1A37/1C37	11	A10-2A29/2C29	11	7	A11A37			A				
A11-1A38/1C38	11	A10-2A11/2C11	11	5	A11A38			A				
A11-1A40/1C40	11	A10-2A12/2C12	11	5	A10A62			A				
A11-1A41/1C41	11	A12-1A41/1C41	11	3	A09B55			A				
A11-1A41/1C41	22	A09-2B05/2D05	22	5	A09B55			A				
A11-1A42/1C42	11	A08-1B17/1D17	11	5	A08B17			A				
A11-1A43/1C43	11	A10-1A33/1C33	11	4	A11A43			A				
A11-1B03/1D03	11	A04-2B19/2D19	11	13	A04B69			A				
A11-1B04/1D04	11	A04-1A32/1C32	11	13	A04A32			A		F		
A11-1B05/1D05	22	A08-1B05/1D05	22	3	A04A79			A		F		
A11-1B07/1D07	11	A10-2A38/2C38	11	11	A11B07			A				
A11-1B08/1D08	11	A14-1B08/1D08	11	4	A04B08			A				
A11-1B08/1D08	22	A07-1B08/1D08	22	5	A04B08			A				
A11-1B09/1D09	11	A14-1B09/1D09	11	4	A04B09			A				
A11-1B09/1D09	22	A07-1B09/1D09	22	5	A04B09			A				
A11-1B10/1D10	11	A14-1B10/1D10	11	4	A04B10			A				
A11-1B10/1D10	22	A07-1B10/1D10	22	5	A04B10			A				
A11-1B11/1D11	11	A14-1B11/1D11	11	4	A04B11			A				
A11-1B11/1D11	22	A07-1B11/1D11	22	5	A04B11			A				

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A11-1B12/1D12	11	A07-1B38/1D38	11	6	A07B38			A		
A11-1B12/1D12	22	A12-1B12/1D12	22	3	A07B38			A		
A11-1B13/1D13	11	A12-1B32/1D32	11	4	A12B32			A		
A11-1B14/1D14	11	A13-2A26/2C26	11	9	A11B14			A		
A11-1B15/1D15	11	A13-2B29/2D29	11	10	A11B15			A		
A11-1B16/1D16	11	A13-2A29/2C29	11	9	A11B16			A		
A11-1B17/1D17	11	A11-1B34/1D34	11	4	A11B17			A		
A11-1B18/1D18	11	A09-1A12/1C12	11	4	A11B18			A		
A11-1B19/1D19	11	A13-2B27/2D27	11	9	A11B19			A		
A11-1B20/1D20	11	A11-2B25/2D25	11	9	A11B75			A		
A11-1B21/1D21	11	A13-2A30/2C30	11	9	A11B21			A		
A11-1B24/1D24	11	A13-1B24/1D24	11	4	A09B24			A		
A11-1B24/1D24	22	A09-1B24/1D24	22	4	A09B24			A		
A11-1B25/1D25	11	A13-1B25/1D25	11	4	A09B25			A		
A11-1B25/1D25	22	A09-1B25/1D25	22	4	A09B25			A		
A11-1B26/1D26	11	A13-1B26/1D26	11	4	A09B26			A		
A11-1B26/1D26	22	A09-1B26/1D26	22	4	A09B26			A		
A11-1B27/1D27	11	A13-1B27/1D27	11	4	A09B27			A		
A11-1B27/1D27	22	A09-1B27/1D27	22	4	A09B27			A		
A11-1B28/1D28	11	A10-2A28/2C28	11	8	A11B28			A		
A11-1B30/1D30	11	A10-2B14/2D14	11	7	A11B30			A		
A11-1B33/1D33	11	A10-2B36/2D36	11	8	A10B86			A		
A11-1B34/1D34	11	A11-1B17/1D17	11	4	A11B17			A		
A11-1B34/1D34	22	A12-1B34/1D34	22	3	A11B17			A		
A11-1B36/1D36	11	A12-1B37/1D37	11	3	A12B37			A		
A11-1B38/1D38	11	A10-1B36/1D36	11	3	A11B38			A		
A11-1B40/1D40	22	A10-2A25/2C25	22	7	A08A55			A		
A11-1B41/1D41	11	A09-1A40/1C40	11	4	A09A40			A		
A11-1B42/1D42	11	A09-2B20/2D20	11	6	A09B70			A		
A11-1B43/1D43	11	A10-1A36/1C36	11	4	A11B43			A		

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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A11-2A04/2C04	11	A13-1B37/1D37	11	5	A13B37			A		
A11-2A05/2C05	11	A13-1A40/1C40	11	5	A13A40			A		
A11-2A07/2C07	11	A13-2A07/2C07	11	4	A09A57			A		
A11-2A07/2C07	22	A09-2A07/2C07	22	4	A09A57			A		
A11-2A08/2C08	11	A13-2A08/2C08	11	4	A09A58			A		
A11-2A08/2C08	22	A09-2A08/2C08	22	4	A09A58			A		
A11-2A09/2C09	11	A13-2A09/2C09	11	4	A09A59			A		
A11-2A09/2C09	22	A09-2A09/2C09	22	4	A09A59			A		
A11-2A10/2C10	11	A13-2A10/2C10	11	4	A09A60			A		
A11-2A10/2C10	22	A09-2A10/2C10	22	4	A09A60			A		
A11-2A11/2C11	11	A13-1A38/1C38	11	6	A13A38			A		
A11-2A12/2C12	11	A13-1B42/1D42	11	5	A13B42			A		
A11-2A13/2C13	11	A09-2A17/2C17	11	4	A11A63			A		
A11-2A14/2C14	22	A10-2A22/2C22	22	3	A11A64			A		
A11-2A15/2C15	11	A10-1B32/1D32	11	6	A11A65			A		
A11-2A16/2C16	22	A10-2B41/2D41	22	5	A08A83			A		
A11-2A17/2C17	11	A12-2A17/2C17	11	3	A09B41			A		
A11-2A17/2C17	22	A08-1B36/1D36	22	7	A09B41			A		
A11-2A18/2C18	11	A08-1A38/1C38	11	7	A08A38			A		
A11-2A24/2C24	11	A13-1B10/1D10	11	10	A13B10			A		
A11-2A25/2C25	11	A12-1B20/1D20	11	9	A11A75			A		
A11-2A27/----		A11-2C27/----			GRNDXX			A		
A11-2A30/2C30	11	A10-2A09/2C09	11	5	A11A80			A		
A11-2A31/2C31	11	A10-2A37/2C37	11	3	A10A87			A		
A11-2A32/2C32	11	A10-2B05/2D05	11	5	A10B55			A		
A11-2A33/2C33	22	A13-2A16/2C16	22	5	A11A83			A		
A11-2A34/2C34	11	A08-2A34/2C34	11	4	A04A84			A		
A11-2A34/2C34	22	A14-2A34/2C34	22	4	A04A84			A		
A11-2A35/----		A11-2C35/----			GRNDXX			A		
A11-2A37/2C37	11	A10-2A18/2C18	11	4	A11A87			A		

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ORIGIN         LEVS      DESTINATION     LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

A11-2A40/2C40  11          A10-1A40/1C40  11     8   A11A90                A

A11-2A41/2C41  11          A10-2B35/2D35  11     3   A11A91                A

A11-2A42/2C42  11          A10-2A35/2C35  11     3   A11A92                A

A11-2A43/2C43  11          A10-2B13/2D13  11     6   A10B63                A

A11-2B03/2D03  11          A09-2A20/2C20  11     5   A09A70                A
A11-2B03/2D03  22          A12-2B03/2D03  22     3   A09A70                A

A11-2B04/2D04  11          A13-1B41/1D41  11     5   A13B41                A

A11-2B05/2D05  11          A13-1B40/1D40  11     5   A13B40                A

A11-2B07/2D07  11          A13-2B07/2D07  11     4   A09B57                A
A11-2B07/2D07  22          A09-2B07/2D07  22     4   A09B57                A

A11-2B08/2D08  11          A13-2B08/2D08  11     4   A09B58                A
A11-2B08/2D08  22          A09-2B08/2D08  22     4   A09B58                A

A11-2B09/2D09  11          A13-2B09/2D09  11     4   A09B59                A
A11-2B09/2D09  22          A09-2B09/2D09  22     4   A09B59                A

A11-2B10/2D10  11          A13-2B10/2D10  11     4   A09B60                A
A11-2B10/2D10  22          A09-2B10/2D10  22     4   A09B60                A

A11-2B11/2D11  11          A13-1A41/1C41  11     5   A13A41                A

A11-2B12/2D12  11          A13-1A42/1C42  11     5   A13A42                A

A11-2B13/2D13  11          A09-2A21/2C21  11     4   A09A71                A
A11-2B13/2D13  22          A13-1B12/1D12  22     8   A09A71                A

A11-2B14/2D14  11          A10-1B43/1D43  11     5   A10B43                A
A11-2B14/2D14  22          A12-2B14/2D14  22     3   A10B43                A

A11-2B15/2D15  11          A09-2A22/2C22  11     4   A09A72                A
A11-2B15/2D15  22          A12-2B15/2D15  22     3   A09A72                A

A11-2B16/2D16  11          A12-2B16/2D16  11     3   A09B37                A
A11-2B16/2D16  22          A08-1A33/1C33  22     7   A09B37                A

A11-2B17/2D17  11          A12-2B17/2D17  11     3   A09A41                A
A11-2B17/2D17  22          A08-1A36/1C36  22     7   A09A41                A

A11-2B18/2D18  11          A12-2B18/2D18  11     3   A09A42                A
A11-2B18/2D18  22          A08-1A37/1C37  22     7   A09A42                A

A11-2B22/2D22  11          A13-1A37/1C37  11     7   A13A37                A

A11-2B25/2D25  11          A11-1B20/1D20  11     9   A11B75                A
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PAGE    51  PACK       A11                                                                                      DATE 87/05/22.
     ORIGIN        LEVS      DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A11-2B27/----             A11-2D27/----                GRNDXX                  A

     A11-2B28/2D28  11         A13-2A03/2C03   11     5     A13A53                  A

     A11-2B29/2D29  11         A12-2A29/2C29   11     3     A12A79                  A

     A11-2B30/2D30  11         A10-2B17/2D17   11     4     A11B80                  A

     A11-2B31/2D31  11         A12-2B31/2D31   11     3     A04B81                  A
     A11-2B31/2D31  22         A09-2B31/2D31   22     4     A04B81                  A

     A11-2B32/2D32  11         A08-1A35/1C35   11     8     A08A35                  A

     A11-2B33/2D33  11         A14-2B33/2D33   11     4     A04B83                  A
     A11-2B33/2D33  22         A07-2B33/2D33   22     5     A04B83                  A

     A11-2B34/2D34  11         A14-2B34/2D34   11     4     A04B84                  A
     A11-2B34/2D34  22         A07-2B34/2D34   22     5     A04B84                  A

     A11-2B36/2D36  11         A09-2A27/2C27   11     4     A09A77                  A
     A11-2B36/2D36  22         A12-2B36/2D36   22     3     A09A77                  A

     A11-2B37/2D37  11         A10-2A17/2C17   11     5     A11B87                  A

     A11-2B38/2D38  11         A10-2B03/2D03   11     6     A10B53                  A
     A11-2B38/2D38  22         A12-2B38/2D38   22     3     A10B53                  A

     A11-2B40/2D40  11         A10-2B12/2D12   11     5     A10B62                  A
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PAGE    52  PACK       A12                                                                                                 DATE 87/05/22.
      ORIGIN        LEVS       DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

      A12-1A05/1C05  22         A11-1A05/1C05  22     3    A04A83                  A         F

      A12-1A08/1C08  11         A14-1A12/1C12  11     4    A04A12                  A
      A12-1A08/1C08  22         A07-1A12/1C12  22     6    A04A12                  A

      A12-1A09/1C09  11         A14-1A13/1C13  11     4    A04A13                  A
      A12-1A09/1C09  22         A07-1A13/1C13  22     6    A04A13                  A

      A12-1A10/1C10  11         A14-1A14/1C14  11     4    A04A14                  A
      A12-1A10/1C10  22         A07-1A14/1C14  22     6    A04A14                  A

      A12-1A11/1C11  11         A14-1A15/1C15  11     4    A04A15                  A
      A12-1A11/1C11  22         A07-1A15/1C15  22     6    A04A15                  A

      A12-1A12/1C12  22         A11-1A12/1C12  22     3    A08B84                  A

      A12-1A13/1C13  11         A10-2A03/2C03  11     7    A12A13                  A

      A12-1A15/1C15  11         A13-1B14/1D14  11     3    A12A15                  A

      A12-1A16/1C16  11         A14-1B16/1D16  11     4    A04B16                  A
      A12-1A16/1C16  22         A07-1B16/1D16  22     5    A04B16                  A

      A12-1A17/1C17  11         A13-1A11/1C11  11     3    A12A17                  A

      A12-1A18/1C18  11         A13-1B19/1D19  11     3    A12A18                  A

      A12-1A19/1C19  11         A11-1A36/1C36  11     4    A11A36                  A

      A12-1A20/1C20  11         A13-1B20/1D20  11     3    A12A20                  A

      A12-1A24/1C24  11         A10-2B16/2D16  11     7    A09A28                  A
      A12-1A24/1C24  22         A09-1A28/1C28  22     4    A09A28                  A

      A12-1A25/1C25  11         A10-2B15/2D15  11     7    A09A29                  A
      A12-1A25/1C25  22         A09-1A29/1C29  22     4    A09A29                  A

      A12-1A26/1C26  11         A10-2B11/2D11  11     7    A09A30                  A
      A12-1A26/1C26  22         A09-1A30/1C30  22     4    A09A30                  A

      A12-1A27/1C27  11         A10-2B10/2D10  11     7    A09A31                  A
      A12-1A27/1C27  22         A09-1A31/1C31  22     4    A09A31                  A

      A12-1A28/1C28  11         A13-2A16/2C16  11     7    A11A83                  A
      A12-1A28/1C28  22         A11-1A28/1C28  22     3    A11A83                  A

      A12-1A35/1C35  22         A11-1A35/1C35  22     3    A09B35                  A

      A12-1A40/----             A12-1C40/----              GRNDXX                  A

      A12-1A41/1C41  11         A11-1A41/1C41  11     3    A09B55                  A

      A12-1B08/1D08  11         A14-1B12/1D12  11     4    A04B12                  A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A12-1B08/1D08	22	A07-1B12/1D12	22	6	A04B12			A		
A12-1B09/1D09	11	A14-1B13/1D13	11	4	A04B13			A		
A12-1B09/1D09	22	A07-1B13/1D13	22	6	A04B13			A		
A12-1B10/1D10	11	A14-1B14/1D14	11	4	A04B14			A		
A12-1B10/1D10	22	A07-1B14/1D14	22	6	A04B14			A		
A12-1B11/1D11	11	A14-1B15/1D15	11	4	A04B15			A		
A12-1B11/1D11	22	A07-1B15/1D15	22	6	A04B15			A		
A12-1B12/1D12	22	A11-1B12/1D12	22	3	A07B38			A		
A12-1B14/1D14	11	A13-1A13/1C13	11	3	A12B14			A		
A12-1B15/1D15	11	A13-1A14/1C14	11	3	A12B15			A		
A12-1B16/1D16	11	A13-1B15/1D15	11	3	A12B16			A		
A12-1B19/1D19	11	A13-1A19/1C19	11	3	A12B19			A		
A12-1B20/1D20	11	A11-2A25/2C25	11	9	A11A75			A		
A12-1B21/1D21	11	A13-1A20/1C20	11	3	A12B21			A		
A12-1B24/1D24	11	A10-2A15/2C15	11	7	A09B28			A		
A12-1B24/1D24	22	A09-1B28/1D28	22	4	A09B28			A		
A12-1B25/1D25	11	A10-2A14/2C14	11	7	A09B29			A		
A12-1B25/1D25	22	A09-1B29/1D29	22	4	A09B29			A		
A12-1B26/1D26	11	A10-2A10/2C10	11	7	A09B30			A		
A12-1B26/1D26	22	A09-1B30/1D30	22	4	A09B30			A		
A12-1B27/1D27	11	A10-2B09/2D09	11	6	A09B31			A		
A12-1B27/1D27	22	A09-1B31/1D31	22	4	A09B31			A		
A12-1B28/1D28	11	A10-2A16/2C16	11	7	A12B28			A		
A12-1B32/1D32	11	A11-1B13/1D13	11	4	A12B32			A		
A12-1B34/1D34	22	A11-1B34/1D34	22	3	A11B17			A		
A12-1B37/1D37	11	A11-1B36/1D36	11	3	A12B37			A		
A12-1B41/1D41	11	A09-1B38/1D38	11	4	A09B38			A		
A12-2A04/2C04	11	A13-2B32/2D32	11	5	A13B82			A		
A12-2A05/2C05	11	A13-2A38/2C38	11	6	A13A88			A		
A12-2A07/2C07	22	A09-2A11/2C11	22	4	A09A61			A		
A12-2A08/2C08	22	A09-2A12/2C12	22	4	A09A62			A		

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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------	QSE
A12-2A09/2C09	22	A09-2A13/2C13	22	4	A09A63			A			
A12-2A10/2C10	22	A09-2A14/2C14	22	4	A09A64			A			
A12-2A11/2C11	11	A13-2A35/2C35	11	5	A13A85			A			
A12-2A12/2C12	11	A13-2B40/2D40	11	5	A13B90			A			
A12-2A17/2C17	11	A11-2A17/2C17	11	3	A09B41			A			
A12-2A27/----		A12-2C27/----			GRNDXX			A			
A12-2A29/2C29	11	A11-2B29/2D29	11	3	A12A79			A			
A12-2A31/2C31	11	A10-1B26/1D26	11	9	A10B26			A			
A12-2A35/----		A12-2C35/----			GRNDXX			A			
A12-2A38/2C38	22	A10-1B24/1D24	22	10	A12A88			A			
A12-2B03/2D03	22	A11-2B03/2D03	22	3	A09A70			A			
A12-2B04/2D04	11	A13-2A32/2C32	11	5	A13A82			A			
A12-2B05/2D05	11	A13-2A36/2C36	11	6	A13A86			A			
A12-2B07/2D07	22	A09-2B11/2D11	22	4	A09B61			A			
A12-2B08/2D08	22	A09-2B12/2D12	22	4	A09B62			A			
A12-2B09/2D09	22	A09-2B13/2D13	22	4	A09B63			A			
A12-2B10/2D10	22	A09-2B14/2D14	22	4	A09B64			A			
A12-2B11/2D11	11	A13-2B42/2D42	11	6	A13B92			A			
A12-2B12/2D12	11	A13-2B38/2D38	11	5	A13B88			A			
A12-2B14/2D14	22	A11-2B14/2D14	22	3	A10B43			A			
A12-2B15/2D15	22	A11-2B15/2D15	22	3	A09A72			A			
A12-2B16/2D16	11	A11-2B16/2D16	11	3	A09B37			A			
A12-2B17/2D17	11	A11-2B17/2D17	11	3	A09A41			A			
A12-2B18/2D18	11	A11-2B18/2D18	11	3	A09A42			A			
A12-2B22/2D22	11	A13-2A33/2C33	11	4	A13A83			A			
A12-2B27/----		A12-2D27/----			GRNDXX			A			
A12-2B28/2D28	11	A13-1A10/1C10	11	10	A13A10			A			

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PAGE    55  PACK        A12                                                                                     DATE 87/05/22.
     ORIGIN         LEVS      DESTINATION     LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A12-2B30/2D30  11          A10-2A33/2C33  11     4   A12B80                A

     A12-2B31/2D31  11          A11-2B31/2D31  11     3   A04B81                A
     A12-2B31/2D31  22          A14-2B31/2D31  22     4   A04B81                A

     A12-2B36/2D36  22          A11-2B36/2D36  22     3   A09A77                A

     A12-2B38/2D38  22          A11-2B38/2D38  22     3   A10B53                A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	---------- DESCRIPTION ----------	QSE
A13-1A09/1C09	11	A07-1A22/1C22	11	6	A07A22			A				
A13-1A10/1C10	11	A12-2B28/2D28	11	10	A13A10			A				
A13-1A11/1C11	11	A12-1A17/1C17	11	3	A12A17			A				
A13-1A12/1C12	11	A10-2A04/2C04	11	8	A10A54			A				
A13-1A13/1C13	11	A12-1B14/1D14	11	3	A12B14			A				
A13-1A14/1C14	11	A12-1B15/1D15	11	3	A12B15			A				
A13-1A16/1C16	11	A07-1B26/1D26	11	6	A07B26			A				
A13-1A17/1C17	11	A07-1B27/1D27	11	6	A07B27			A				
A13-1A18/1C18	11	A07-1B28/1D28	11	6	A07B28			A				
A13-1A19/1C19	11	A12-1B19/1D19	11	3	A12B19			A				
A13-1A20/1C20	11	A12-1B21/1D21	11	3	A12B21			A				
A13-1A21/1C21	11	A09-2A33/2C33	11	10	A09A83			A				
A13-1A22/1C22	11	A09-1A35/1C35	11	5	A09A35			A				
A13-1A24/1C24	11	A11-1A24/1C24	11	4	A09A24			A				
A13-1A24/1C24	22	A10-2A32/2C32	22	9	A09A24			A				
A13-1A25/1C25	11	A11-1A25/1C25	11	4	A09A25			A				
A13-1A25/1C25	22	A10-2B31/2D31	22	9	A09A25			A				
A13-1A26/1C26	11	A11-1A26/1C26	11	4	A09A26			A				
A13-1A26/1C26	22	A10-2B28/2D28	22	9	A09A26			A				
A13-1A27/1C27	11	A11-1A27/1C27	11	4	A09A27			A				
A13-1A27/1C27	22	A10-2B27/2D27	22	8	A09A27			A				
A13-1A28/1C28	11	A07-1A24/1C24	11	6	A07A24			A				
A13-1A29/1C29	11	A07-1A25/1C25	11	6	A07A25			A				
A13-1A30/1C30	11	A10-1A32/1C32	11	4	A10A32			A				
A13-1A31/1C31	11	A07-1A26/1C26	11	6	A07A26			A				
A13-1A32/1C32	11	A07-1A27/1C27	11	6	A07A27			A				
A13-1A33/1C33	11	A07-1A28/1C28	11	6	A07A28			A				
A13-1A34/1C34	11	A07-1B30/1D30	11	6	A07B30			A				
A13-1A37/1C37	11	A11-2B22/2D22	11	7	A13A37			A				

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PAGE    57  PACK        A13                                                                                 DATE 87/05/22.
     ORIGIN         LEVS       DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A13-1A38/1C38   11          A11-2A11/2C11   11     6   A13A38                A
     A13-1A40/1C40   11          A11-2A05/2C05   11     5   A13A40                A
     A13-1A41/1C41   11          A11-2B11/2D11   11     5   A13A41                A
     A13-1A42/1C42   11          A11-2B12/2D12   11     5   A13A42                A
     A13-1B04/----               A13-1D04/----              GRNDXX                A
     A13-1B08/----               A13-1D08/----              GRNDXX                A
     A13-1B10/1D10   11          A11-2A24/2C24   11    10   A13B10                A
     A13-1B12/1D12   22          A11-2B13/2D13   22     8   A09A71                A
     A13-1B13/1D13   11          A10-2A08/2C08   11     8   A13B13                A
     A13-1B14/1D14   11          A12-1A15/1C15   11     3   A12A15                A
     A13-1B15/1D15   11          A12-1B16/1D16   11     3   A12B16                A
     A13-1B16/----               A13-1D16/----              GRNDXX                A
     A13-1B18/1D18   11          A10-2B43/2D43   11    11   A10B93                A
     A13-1B19/1D19   11          A12-1A18/1C18   11     3   A12A18                A
     A13-1B20/1D20   11          A12-1A20/1C20   11     3   A12A20                A
     A13-1B21/1D21   11          A08-1A17/1C17   11     6   A08A17                A
     A13-1B21/1D21   22          A10-2A42/2C42   22    10   A08A17                A
     A13-1B22/1D22   11          A09-2B33/2D33   11    10   A09B83                A
     A13-1B24/1D24   11          A11-1B24/1D24   11     4   A09B24                A
     A13-1B24/1D24   22          A10-2A31/2C31   22     9   A09B24                A
     A13-1B25/1D25   11          A11-1B25/1D25   11     4   A09B25                A
     A13-1B25/1D25   22          A10-2B30/2D30   22     9   A09B25                A
     A13-1B26/1D26   11          A11-1B26/1D26   11     4   A09B26                A
     A13-1B26/1D26   22          A10-2A27/2C27   22     9   A09B26                A
     A13-1B27/1D27   11          A11-1B27/1D27   11     4   A09B27                A
     A13-1B27/1D27   22          A10-2A26/2C26   22     8   A09B27                A
     A13-1B30/1D30   11          A08-1A34/1C34   11     6   A08A34                A
     A13-1B33/1D33   11          A08-1B34/1D34   11     6   A08B34                A
     A13-1B35/1D35   11          A10-2B38/2D38   11     9   A10B88                A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A13-1B37/1D37	11	A11-2A04/2C04	11	5	A13B37			A				
A13-1B40/1D40	11	A11-2B05/2D05	11	5	A13B40			A				
A13-1B41/1D41	11	A11-2B04/2D04	11	5	A13B41			A				
A13-1B42/1D42	11	A11-2A12/2C12	11	5	A13B42			A				
A13-2A03/2C03	11	A11-2B28/2D28	11	5	A13A53			A				
A13-2A05/2C05	11	A10-2B22/2D22	11	5	A10B72			A				
A13-2A07/2C07	11	A11-2A07/2C07	11	4	A09A57			A				
A13-2A08/2C08	11	A11-2A08/2C08	11	4	A09A58			A				
A13-2A09/2C09	11	A11-2A09/2C09	11	4	A09A59			A				
A13-2A10/2C10	11	A11-2A10/2C10	11	4	A09A60			A				
A13-2A12/2C12	11	A10-2B42/2D42	11	6	A10B92			A				
A13-2A16/2C16	11	A12-1A28/1C28	11	7	A11A83			A				
A13-2A16/2C16	22	A11-2A33/2C33	22	5	A11A83			A				
A13-2A17/2C17	11	A10-2A30/2C30	11	5	A13A67			A				
A13-2A26/2C26	11	A11-1B14/1D14	11	9	A11B14			A				
A13-2A27/2C27	11	A11-1A18/1C18	11	9	A11A18			A				
A13-2A29/2C29	11	A11-1B16/1D16	11	9	A11B16			A				
A13-2A30/2C30	11	A11-1B21/1D21	11	9	A11B21			A				
A13-2A32/2C32	11	A12-2B04/2D04	11	5	A13A82			A				
A13-2A33/2C33	11	A12-2B22/2D22	11	4	A13A83			A				
A13-2A35/2C35	11	A12-2A11/2C11	11	5	A13A85			A				
A13-2A36/2C36	11	A12-2B05/2D05	11	6	A13A86			A				
A13-2A38/2C38	11	A12-2A05/2C05	11	6	A13A88			A				
A13-2A41/2C41	11	A08-2A03/2C03	11	7	A08A53			A				
A13-2A43/2C43	11	A09-2A24/2C24	11	6	A09A74			A				
A13-2B03/2D03	11	A10-2B33/2D33	11	6	A13B53			A				
A13-2B07/2D07	11	A11-2B07/2D07	11	4	A09B57			A				
A13-2B08/2D08	11	A11-2B08/2D08	11	4	A09B58			A				

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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A13-2B09/2D09	11	A11-2B09/2D09	11	4	A09B59			A		
A13-2B10/2D10	11	A11-2B10/2D10	11	4	A09B60			A		
A13-2B11/2D11	11	A09-2B21/2D21	11	5	A09B71			A		
A13-2B12/2D12	11	A10-2A43/2C43	11	6	A10A93			A		
A13-2B13/2D13	11	A10-2B32/2D32	11	5	A13B63			A		
A13-2B16/----		A13-2D16/----			GRNDXX			A		
A13-2B17/2D17	11	A09-2B24/2D24	11	5	A09B74			A		
A13-2B18/----		A13-2D18/----			GRNDXX			A		
A13-2B20/2D20	11	A09-2A25/2C25	11	5	A09A75			A		
A13-2B26/2D26	11	A11-1A15/1C15	11	9	A11A15			A		
A13-2B27/2D27	11	A11-1B19/1D19	11	9	A11B19			A		
A13-2B29/2D29	11	A11-1B15/1D15	11	10	A11B15			A		
A13-2B30/2D30	11	A11-1A20/1C20	11	9	A11A20			A		
A13-2B31/2D31	11	A10-1B25/1D25	11	9	A10B25			A		
A13-2B32/2D32	11	A12-2A04/2C04	11	5	A13B82			A		
A13-2B33/2D33	11	A08-2A04/2C04	11	7	A08A54			A		
A13-2B34/2D34	11	A11-1A17/1C17	11	10	A11A17			A		
A13-2B35/2D35	11	A09-2B26/2D26	11	5	A09B76			A		
A13-2B36/2D36	11	A09-2B34/2D34	11	5	A09B84			A		
A13-2B37/----		A13-2D37/----			GRNDXX			A		
A13-2B38/2D38	11	A12-2B12/2D12	11	5	A13B88			A		
A13-2B40/2D40	11	A12-2A12/2C12	11	5	A13B90			A		
A13-2B42/2D42	11	A12-2B11/2D11	11	6	A13B92			A		
A13-2B43/2D43	11	A08-2B03/2D03	11	7	A08B53			A		

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A14-1A03/1C03	11	A04-2B28/2D28	11	13	A04B78			A				
A14-1A04/1C04	11	A04-2A12/2C12	11	13	A04A62			A				
A14-1A08/1C08	11	A11-1A08/1C08	11	4	A04A08			A				
A14-1A09/1C09	11	A11-1A09/1C09	11	4	A04A09			A				
A14-1A10/1C10	11	A11-1A10/1C10	11	4	A04A10			A				
A14-1A11/1C11	11	A11-1A11/1C11	11	4	A04A11			A				
A14-1A12/1C12	11	A12-1A08/1C08	11	4	A04A12			A				
A14-1A13/1C13	11	A12-1A09/1C09	11	4	A04A13			A				
A14-1A14/1C14	11	A12-1A10/1C10	11	4	A04A14			A				
A14-1A15/1C15	11	A12-1A11/1C11	11	4	A04A15			A				
A14-1A16/1C16	11	A11-1A16/1C16	11	4	A04A16			A				
A14-1A17/1C17	11	A06-2A13/2C13	11	10	A14A17			A				
A14-1A18/1C18	11	A05-2B26/2D26	11	11	A05B76			A				
A14-1A19/1C19	11	A05-2B25/2D25	11	11	A05B75			A				
A14-1A20/1C20	11	A18-2B28/2D28	11	13	A18B78			A				
A14-1A21/1C21	11	A18-2A12/2C12	11	13	A18A62			A				
A14-1A29/1C29	22	A16-1A08/1C08	22	5	A18A08			A				
A14-1A30/1C30	22	A16-1A09/1C09	22	5	A18A09			A				
A14-1A31/1C31	22	A16-1A10/1C10	22	5	A18A10			A				
A14-1A32/1C32	22	A16-1A11/1C11	22	5	A18A11			A				
A14-1A33/1C33	22	A16-1A12/1C12	22	5	A18A12			A				
A14-1A34/1C34	22	A16-1A13/1C13	22	5	A18A13			A				
A14-1A35/1C35	22	A16-1A14/1C14	22	5	A18A14			A				
A14-1A36/1C36	22	A16-1A15/1C15	22	5	A18A15			A				
A14-1A37/1C37	22	A16-1A16/1C16	22	5	A18A16			A				
A14-1A38/1C38	11	A20-2A13/2C13	11	7	A14A38			A				
A14-1A40/1C40	11	A19-2B26/2D26	11	8	A19B76			A				

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PAGE    61  PACK        A14                                                                                              DATE 87/05/22.
    ORIGIN        LEVS       DESTINATION     LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

    A14-1A41/1C41  11         A19-2B25/2D25  11     8   A19B75                 A
    A14-1B03/1D03  11         A04-2B20/2D20  11    13   A04B70                 A
    A14-1B04/1D04  11         A04-1B33/1D33  11    13   A04B33                 A
    A14-1B08/1D08  11         A11-1B08/1D08  11     4   A04B08                 A
    A14-1B09/1D09  11         A11-1B09/1D09  11     4   A04B09                 A
    A14-1B10/1D10  11         A11-1B10/1D10  11     4   A04B10                 A
    A14-1B11/1D11  11         A11-1B11/1D11  11     4   A04B11                 A
    A14-1B12/1D12  11         A12-1B08/1D08  11     4   A04B12                 A
    A14-1B13/1D13  11         A12-1B09/1D09  11     4   A04B13                 A
    A14-1B14/1D14  11         A12-1B10/1D10  11     4   A04B14                 A
    A14-1B15/1D15  11         A12-1B11/1D11  11     4   A04B15                 A
    A14-1B16/1D16  11         A12-1A16/1C16  11     4   A04B16                 A
    A14-1B17/1D17  11         A06-2B13/2D13  11    10   A06B63                 A
    A14-1B18/1D18  11         A05-2A26/2C26  11    11   A05A76                 A
    A14-1B19/1D19  11         A05-2A25/2C25  11    11   A05A75                 A
    A14-1B20/1D20  11         A18-2B20/2D20  11    13   A18B70                 A
    A14-1B21/1D21  11         A18-1B33/1D33  11     5   A18B33                 A
    A14-1B29*1D29  22         A16-1B08/1D08  22     5   A18B08                 A
    A14-1B30/1D30  22         A16-1B09/1D09  22     5   A18B09                 A
    A14-1B31/1D31  22         A16-1B10/1D10  22     5   A18B10                 A
    A14-1B32/1D32  22         A16-1B11/1D11  22     5   A18B11                 A
    A14-1B33/1D33  22         A16-1B12/1D12  22     5   A18B12                 A
    A14-1B34/1D34  22         A16-1B13/1D13  22     5   A18B13                 A
    A14-1B35/1D35  22         A16-1B14/1D14  22     5   A18B14                 A
    A14-1B36/1D36  22         A16-1B15/1D15  22     5   A18B15                 A
    A14-1B37/1D37  22         A16-1B16/1D16  22     5   A18B16                 A
    A14-1B38/1D38  11         A20-2B13/2D13  11     7   A20B63                 A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------	QSE
A14-1B40/1D40	11	A19-2A26/2C26	11	8	A19A76			A			
A14-1B41/1D41	11	A19-2A25/2C25	11	7	A19A75			A			
A14-2A11/2C11	11	A07-1B37/1D37	11	7	A07B37			A			
A14-2A13/2C13	11	A20-2A14/2C14	11	6	A14A63			A			
A14-2A14/2C14	11	A06-2A14/2C14	11	7	A14A64			A			
A14-2A15/2C15	22	A17-2A30/2C30	22	5	A18A80			A			
A14-2A16/2C16	22	A17-2A31/2C31	22	5	A18A81			A			
A14-2A19/2C19	11	A16-2A34/2C34	11	4	A18A84			A			
A14-2A20*2C20	11	A17-2A35/2C35	11	5	A17A85			A			
A14-2A21*2C21	11	A17-2A36/2C36	11	5	A17A86			A			
A14-2A22*2C22	11	A17-2A37/2C37	11	5	A17A87			A			
A14-2A24*2C24	11	A17-2A38/2C38	11	5	A17A88			A			
A14-2A25*2C25	11	A17-2A40/2C40	11	5	A17A90			A			
A14-2A26*2C26	11	A17-2A41/2C41	11	5	A17A91			A			
A14-2A27*2C27	11	A17-2A42/2C42	11	5	A17A92			A			
A14-2A28*2C28	11	A17-2A43/2C43	11	5	A17A93			A			
A14-2A30/2C30	11	A06-2A30/2C30	11	7	A04A80			A			
A14-2A31/2C31	11	A06-2A31/2C31	11	7	A04A81			A			
A14-2A34/2C34	22	A11-2A34/2C34	22	4	A04A84			A			
A14-2A35/2C35	11	A09-2A35/2C35	11	5	A03A85			A			
A14-2A36/2C36	11	A09-2A36/2C36	11	5	A03A86			A			
A14-2A37/2C37	11	A09-2A37/2C37	11	5	A03A87			A			
A14-2A38/2C38	11	A09-2A38/2C38	11	5	A03A88			A			
A14-2A40/2C40	11	A09-2A40/2C40	11	5	A03A90			A			
A14-2A41/2C41	11	A09-2A41/2C41	11	5	A03A91			A			
A14-2A42/2C42	11	A09-2A42/2C42	11	5	A03A92			A			
A14-2A43/2C43	11	A09-2A43/2C43	11	5	A03A93			A			

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PAGE    63  PACK       A14                                                                               DATE 87/05/22.
     ORIGIN         LEVS      DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A14-2B11/2D11   11         A21-1B37/1D37   11     8    A21B37                 A
     A14-2B15/2D15   22         A17-2B30/2D30   22     5    A18B80                 A
     A14-2B16/2D16   22         A17-2B31/2D31   22     5    A18B81                 A
     A14-2B17/2D17   11         A18-2B32/2D32   11     5    A18B82                 A
     A14-2B18/2D18   22         A16-2B33/2D33   22     4    A18B83                 A
     A14-2B19/2D19   22         A16-2B34/2D34   22     4    A18B84                 A
     A14-2B20*2D20   11         A17-2B35/2D35   11     5    A17B85                 A
     A14-2B21*2D21   11         A17-2B36/2D36   11     5    A17B86                 A
     A14-2B22*2D22   11         A17-2B37/2D37   11     5    A17B87                 A
     A14-2B24*2D24   11         A17-2B38/2D38   11     5    A17B88                 A
     A14-2B25*2D25   11         A17-2B40/2D40   11     5    A17B90                 A
     A14-2B26*2D26   11         A17-2B41/2D41   11     5    A17B91                 A
     A14-2B27*2D27   11         A17-2B42/2D42   11     5    A17B92                 A
     A14-2B28*2D28   11         A17-2B43/2D43   11     5    A17B93                 A
     A14-2B30/2D30   11         A06-2B30/2D30   11     7    A04B80                 A
     A14-2B31/2D31   22         A12-2B31/2D31   22     4    A04B81                 A
     A14-2B32/2D32   22         A06-2B32/2D32   22     7    A04B82                 A
     A14-2B33/2D33   11         A11-2B33/2D33   11     4    A04B83                 A
     A14-2B34/2D34   11         A11-2B34/2D34   11     4    A04B84                 A
     A14-2B35/2D35   11         A09-2B35/2D35   11     5    A03B85                 A
     A14-2B36/2D36   11         A09-2B36/2D36   11     5    A03B86                 A
     A14-2B37/2D37   11         A09-2B37/2D37   11     5    A03B87                 A
     A14-2B38/2D38   11         A09-2B38/2D38   11     5    A03B88                 A
     A14-2B40/2D40   11         A09-2B40/2D40   11     5    A03B90                 A
     A14-2B41/2D41   11         A09-2B41/2D41   11     5    A03B91                 A
     A14-2B42/2D42   11         A09-2B42/2D42   11     5    A03B92                 A
     A14-2B43/2D43   11         A09-2B43/2D43   11     5    A03B93                 A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A15-1A03/1C03	11	A18-2B03/2D03	11	8	A18B53			A				
A15-1A04/1C04	11	A17-1B04/1D04	11	4	A18B72			A				
A15-1A07/1C07	11	A18-1A04/1C04	11	13	A18A04			A				
A15-1A14/1C14	11	A18-2A08/2C08	11	8	A15A14			A				
A15-1A19/1C19	11	A18-2B17/2D17	11	8	A18B67			A				
A15-1A20/1C20	11	A18-1A36/1C36	11	5	A15A20			A				
A15-1A22/1C22	11	A18-1A33/1C33	11	5	A18A33			A				
A15-1A29/1C29	11	A18-2A05/2C05	11	6	A15A29			A				
A15-1A35/1C35	11	A18-1A34/1C34	11	4	A16A74			A				
A15-1A37/1C37	11	A16-1A37/1C37	11	3	A15A37			A				
A15-1A38/1C38	11	A16-1A38/1C38	11	3	A15A38			A				
A15-1A40/1C40	11	A16-1A40/1C40	11	3	A15A40			A				
A15-1A41/1C41	11	A16-1A41/1C41	11	3	A15A41			A				
A15-1A42/1C42	11	A16-1A42/1C42	11	3	A15A42			A				
A15-1A43/1C43	11	A16-1A43/1C43	11	3	A15A43			A				
A15-1B03/1D03	11	A18-1B43/1D43	11	7	A15B03			A				
A15-1B04/1D04	11	A18-1A41/1C41	11	7	A15B04			A				
A15-1B14/1D14	11	A18-2A07/2C07	11	8	A15B14			A				
A15-1B15/1D15	11	A16-2A42/2C42	11	11	A15B15			A				
A15-1B19/1D19	11	A16-2B30/2D30	11	9	A15B19			A				
A15-1B22/1D22	11	A18-2B16/2D16	11	8	A18B66			A				
A15-1B29/1D29	11	A16-2A41/2C41	11	9	A15B29			A				
A15-1B30/1D30	11	A16-2B32/2D32	11	8	A15B30			A				
A15-1B37/1D37	11	A16-1B37/1D37	11	3	A15B37			A				
A15-1B38/1D38	11	A16-1B38/1D38	11	3	A15B38			A				
A15-1B40/1D40	11	A16-1B40/1D40	11	3	A15B40			A				
A15-1B41/1D41	11	A16-1B41/1D41	11	3	A15B41			A				

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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------	QSE
A15-1B42/1D42	11	A16-1B42/1D42	11	3	A15B42			A			
A15-1B43/1D43	11	A16-1B43/1D43	11	3	A15B43			A			
A15-2A04/2C04	11	A18-2B10/2D10	11	5	A18B60			A			
A15-2A09/2C09	11	A18-2A27/2C27	11	5	A15A59			A			
A15-2A15/----		A15-2C15/----			GRNDXX			A			
A15-2A19/----		A15-2C19/----			GRNDXX			A			
A15-2A27/----		A15-2C27/----			GRNDXX			A			
A15-2A31/----		A15-2C31/----			GRNDXX			A			
A15-2A35/----		A15-2C35/----			GRNDXX			A			
A15-2A43/----		A15-2C43/----			GRNDXX			A			
A15-2B04/2D04	11	A16-2A36/2C36	11	6	A15B54			A			
A15-2B09/2D09	11	A16-2A38/2C38	11	5	A18A74			A			
A15-2B10/2D10	11	A18-2B25/2D25	11	5	A18B75			A			
A15-2B13/2D13	11	A18-2A21/2C21	11	4	A15B63			A			
A15-2B14/2D14	11	A17-2A26/2C26	11	4	A17A76			A			
A15-2B15/----		A15-2D15/----			GRNDXX			A			
A15-2B19/----		A15-2D19/----			GRNDXX			A			
A15-2B27/----		A15-2D27/----			GRNDXX			A			
A15-2B31/----		A15-2D31/----			GRNDXX			A			
A15-2B35/----		A15-2D35/----			GRNDXX			A			
A15-2B43/----		A15-2D43/----			GRNDXX			A			

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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A16-1A03/1C03	11	A18-1A03/1C03	11	13	A18A03			A				
A16-1A04/1C04	11	A18-2B09/2D09	11	13	A18B59			A				
A16-1A05/1C05	11	A18-1A05/1C05	11	13	A18A05			A				
A16-1A08/1C08	11	A18-1A08/1C08	11	4	A18A08			A				
A16-1A08/1C08	22	A14-1A29/1C29	22	5	A18A08			A				
A16-1A09/1C09	11	A18-1A09/1C09	11	4	A18A09			A				
A16-1A09/1C09	22	A14-1A30/1C30	22	5	A18A09			A				
A16-1A10/1C10	11	A18-1A10/1C10	11	4	A18A10			A				
A16-1A10/1C10	22	A14-1A31/1C31	22	5	A18A10			A				
A16-1A11/1C11	11	A18-1A11/1C11	11	4	A18A11			A				
A16-1A11/1C11	22	A14-1A32/1C32	22	5	A18A11			A				
A16-1A12/1C12	11	A18-1A12/1C12	11	4	A18A12			A				
A16-1A12/1C12	22	A14-1A33/1C33	22	5	A18A12			A				
A16-1A13/1C13	11	A18-1A13/1C13	11	4	A18A13			A				
A16-1A13/1C13	22	A14-1A34/1C34	22	5	A18A13			A				
A16-1A14/1C14	11	A18-1A14/1C14	11	4	A18A14			A				
A16-1A14/1C14	22	A14-1A35/1C35	22	5	A18A14			A				
A16-1A15/1C15	11	A18-1A15/1C15	11	4	A18A15			A				
A16-1A15/1C15	22	A14-1A36/1C36	22	5	A18A15			A				
A16-1A16/1C16	11	A18-1A16/1C16	11	4	A18A16			A				
A16-1A16/1C16	22	A14-1A37/1C37	22	5	A18A16			A				
A16-1A19/1C19	11	A18-1B42/1D42	11	5	A16A19			A				
A16-1A20/1C20	11	A22-2A32/2C32	11	10	A22A82			A				
A16-1A21/1C21	11	A18-2A14/2C14	11	8	A18A64			A				
A16-1A24/1C24	11	A17-1A24/1C24	11	3	A17A24			A				
A16-1A25/1C25	11	A17-1A25/1C25	11	3	A17A25			A				
A16-1A26/1C26	11	A17-1A26/1C26	11	3	A17A26			A				
A16-1A27/1C27	11	A17-1A27/1C27	11	3	A17A27			A				
A16-1A28/1C28	11	A17-1A28/1C28	11	3	A17A28			A				
A16-1A29/1C29	11	A17-1A29/1C29	11	3	A17A29			A				
A16-1A30/1C30	11	A17-1A30/1C30	11	3	A17A30			A				

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PAGE    67  PACK        A16                                                                                      DATE 87/05/22.
     ORIGIN         LEVS       DESTINATION      LEVS  LTH   SIGNAL   CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE
     A16-1A31/1C31   11          A17-1A31/1C31   11     3   A17A31                  A
     A16-1A35/1C35   11          A18-2B07/2D07   11     6   A18B57                  A
     A16-1A37/1C37   11          A15-1A37/1C37   11     3   A15A37                  A
     A16-1A38/1C38   11          A15-1A38/1C38   11     3   A15A38                  A
     A16-1A40/1C40   11          A15-1A40/1C40   11     3   A15A40                  A
     A16-1A41/1C41   11          A15-1A41/1C41   11     3   A15A41                  A
     A16-1A42/1C42   11          A15-1A42/1C42   11     3   A15A42                  A
     A16-1A43/1C43   11          A15-1A43/1C43   11     3   A15A43                  A
     A16-1B03/1D03   11          A18-1B03/1D03   11    13   A18B03                  A
     A16-1B08/1D08   11          A18-1B08/1D08   11     4   A18B08                  A
     A16-1B08/1D08   22          A14-1B29*1D29   22     5   A18B08                  A
     A16-1B09/1D09   11          A18-1B09/1D09   11     4   A18B09                  A
     A16-1B09/1D09   22          A14-1B30/1D30   22     5   A18B09                  A
     A16-1B10/1D10   11          A18-1B10/1D10   11     4   A18B10                  A
     A16-1B10/1D10   22          A14-1B31/1D31   22     5   A18B10                  A
     A16-1B11/1D11   11          A18-1B11/1D11   11     4   A18B11                  A
     A16-1B11/1D11   22          A14-1B32/1D32   22     5   A18B11                  A
     A16-1B12/1D12   11          A18-1B12/1D12   11     4   A18B12                  A
     A16-1B12/1D12   22          A14-1B33/1D33   22     5   A18B12                  A
     A16-1B13/1D13   11          A18-1B13/1D13   11     4   A18B13                  A
     A16-1B13/1D13   22          A14-1B34/1D34   22     5   A18B13                  A
     A16-1B14/1D14   11          A18-1B14/1D14   11     4   A18B14                  A
     A16-1B14/1D14   22          A14-1B35/1D35   22     5   A18B14                  A
     A16-1B15/1D15   11          A18-1B15/1D15   11     4   A18B15                  A
     A16-1B15/1D15   22          A14-1B36/1D36   22     5   A18B15                  A
     A16-1B16/1D16   11          A18-1B16/1D16   11     4   A18B16                  A
     A16-1B16/1D16   22          A14-1B37/1D37   22     5   A18B16                  A
     A16-1B24/1D24   11          A17-1B24/1D24   11     3   A17B24                  A
     A16-1B25/1D25   11          A17-1B25/1D25   11     3   A17B25                  A
     A16-1B26/1D26   11          A17-1B26/1D26   11     3   A17B26                  A
     A16-1B27/1D27   11          A17-1B27/1D27   11     3   A17B27                  A
     A16-1B28/1D28   11          A17-1B28/1D28   11     3   A17B28                  A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A16-1B29/1D29	11	A17-1B29/1D29	11	3	A17B29			A				
A16-1B30/1D30	11	A17-1B30/1D30	11	3	A17B30			A				
A16-1B31/1D31	11	A17-1B31/1D31	11	3	A17B31			A				
A16-1B36/1D36	11	A22-2A17/2C17	11	8	A16B36			A				
A16-1B37/1D37	11	A15-1B37/1D37	11	3	A15B37			A				
A16-1B38/1D38	11	A15-1B38/1D38	11	3	A15B38			A				
A16-1B40/1D40	11	A15-1B40/1D40	11	3	A15B40			A				
A16-1B41/1D41	11	A15-1B41/1D41	11	3	A15B41			A				
A16-1B42/1D42	11	A15-1B42/1D42	11	3	A15B42			A				
A16-1B43/1D43	11	A15-1B43/1D43	11	3	A15B43			A				
A16-2A03/2C03	11	A17-2B20/2D20	11	4	A17B70			A				
A16-2A07/2C07	11	A17-2A07/2C07	11	3	A17A57			A				
A16-2A08/2C08	11	A17-2A08/2C08	11	3	A17A58			A				
A16-2A09/2C09	11	A17-2A09/2C09	11	3	A17A59			A				
A16-2A10/2C10	11	A17-2A10/2C10	11	3	A17A60			A				
A16-2A11/2C11	11	A17-2A11/2C11	11	3	A17A61			A				
A16-2A12/2C12	11	A17-2A12/2C12	11	3	A17A62			A				
A16-2A13/2C13	11	A17-2A13/2C13	11	3	A17A63			A				
A16-2A14/2C14	11	A17-2A14/2C14	11	3	A17A64			A				
A16-2A20/2C20	11	A18-2A26/2C26	11	4	A16A70			A				
A16-2A21/2C21	11	A23-2B19/2D19	11	7	A23B69			A				
A16-2A22/2C22	11	A18-1A43/1C43	11	6	A18A43			A				
A16-2A24/2C24	22	A18-1A34/1C34	22	7	A16A74			A				
A16-2A25/2C25	11	A18-2A03/2C03	11	5	A18A53			A				
A16-2A26/2C26	11	A17-2B34/2D34	11	4	A17B84			A				
A16-2A34/2C34	11	A14-2A19/2C19	11	4	A18A84			A				
A16-2A34/2C34	22	A18-2A34/2C34	22	4	A18A84			A				

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A16-2A36/2C36	11	A15-2B04/2D04	11	6	A15B54			A				
A16-2A37/2C37	11	A18-2A20/2C20	11	5	A18A70			A				
A16-2A38/2C38	11	A15-2B09/2D09	11	5	A18A74			A				
A16-2A38/2C38	22	A18-2A24/2C24	22	4	A18A74			A				
A16-2A40/2C40	11	A18-2A15/2C15	11	5	A18A65			A				
A16-2A41/2C41	11	A15-1B29/1D29	11	9	A15B29			A				
A16-2A41/2C41	22	A18-1B35/1D35	22	9	A15B29			A				
A16-2A42/2C42	11	A15-1B15/1D15	11	11	A15B15			A				
A16-2A43/2C43	11	A17-2A25/2C25	11	4	A17A75			A				
A16-2B04/2D04	11	A17-1B35/1D35	11	5	A17B35			A				
A16-2B07/2D07	11	A17-2B07/2D07	11	3	A17B57			A				
A16-2B08/2D08	11	A17-2B08/2D08	11	3	A17B58			A				
A16-2B09/2D09	11	A17-2B09/2D09	11	3	A17B59			A				
A16-2B10/2D10	11	A17-2B10/2D10	11	3	A17B60			A				
A16-2B11/2D11	11	A17-2B11/2D11	11	3	A17B61			A				
A16-2B12/2D12	11	A17-2B12/2D12	11	3	A17B62			A				
A16-2B13/2D13	11	A17-2B13/2D13	11	3	A17B63			A				
A16-2B14/2D14	11	A17-2B14/2D14	11	3	A17B64			A				
A16-2B15/2D15	11	A17-1A35/1C35	11	6	A17A35			A				
A16-2B16/2D16	11	A18-1B36/1D36	11	6	A16B66			A				
A16-2B17/2D17	11	A18-2B18/2D18	11	4	A18B68			A				
A16-2B18/2D18	11	A17-2A22/2C22	11	3	A17A72			A				
A16-2B19/2D19	11	A22-1B37/1D37	11	8	A22B37			A				
A16-2B27/2D27	11	A18-2A04/2C04	11	5	A16B77			A				
A16-2B28/2D28	11	A18-2B15/2D15	11	4	A22B54			A				
A16-2B29/2D29	11	A18-2B04/2D04	11	5	A16B79			A				
A16-2B30/2D30	11	A15-1B19/1D19	11	9	A15B19			A				
A16-2B31/2D31	11	A17-2B21/2D21	11	4	A17B71			A				

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	---------- DESCRIPTION ----------	QSE
A16-2B32/2D32	11	A15-1B30/1D30	11	8	A15B30			A				
A16-2B32/2D32	22	A18-2B05/2D05	22	5	A15B30			A				
A16-2B33/2D33	11	A18-2B33/2D33	11	4	A18B83			A				
A16-2B33/2D33	22	A14-2B18/2D18	22	4	A18B83			A				
A16-2B34/2D34	11	A18-2B34/2D34	11	4	A18B84			A				
A16-2B34/2D34	22	A14-2B19/2D19	22	4	A18B84			A				
A16-2B35/2D35	22	A18-2A05/2C05	22	6	A15A29			A				
A16-2B42/2D42	22	A18-1A36/1C36	22	9	A15A20			A				
A16-2B43/2D43	11	A18-1A35/1C35	11	9	A16B93			A				

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     ORIGIN          LEVS       DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A17-1A12/1C12   11           A18-1A40/1C40  11      5    A18A40                A
     A17-1A13/1C13   11           A17-1B34/1D34  11      5    A17B34                A
     A17-1A24/1C24   11           A16-1A24/1C24  11      3    A17A24                A
     A17-1A24/1C24   22           A18-1A24/1C24  22      3    A17A24                A
     A17-1A25/1C25   11           A16-1A25/1C25  11      3    A17A25                A
     A17-1A25/1C25   22           A18-1A25/1C25  22      3    A17A25                A
     A17-1A26/1C26   11           A16-1A26/1C26  11      3    A17A26                A
     A17-1A26/1C26   22           A18-1A26/1C26  22      3    A17A26                A
     A17-1A27/1C27   11           A16-1A27/1C27  11      3    A17A27                A
     A17-1A27/1C27   22           A18-1A27/1C27  22      3    A17A27                A
     A17-1A28/1C28   11           A16-1A28/1C28  11      3    A17A28                A
     A17-1A28/1C28   22           A18-1A28/1C28  22      3    A17A28                A
     A17-1A29/1C29   11           A16-1A29/1C29  11      3    A17A29                A
     A17-1A29/1C29   22           A18-1A29/1C29  22      3    A17A29                A
     A17-1A30/1C30   11           A16-1A30/1C30  11      3    A17A30                A
     A17-1A30/1C30   22           A18-1A30/1C30  22      3    A17A30                A
     A17-1A31/1C31   11           A16-1A31/1C31  11      3    A17A31                A
     A17-1A31/1C31   22           A18-1A31/1C31  22      3    A17A31                A
     A17-1A32/1C32   11           A18-2B29/2D29  11      8    A18B79                A
     A17-1A34/1C34   11           A18-1B22/1D22  11      4    A17A34                A
     A17-1A35/1C35   11           A16-2B15/2D15  11      6    A17A35                A
     A17-1A43/1C43   11           A18-1B38/1D38  11      3    A17A43                A
     A17-1B03/1D03   11           A17-2B24/2D24  11     10    A17B74                A
     A17-1B04/1D04   11           A15-1A04/1C04  11      4    A18B72                A
     A17-1B04/1D04   22           A17-2A34/2C34  22     11    A18B72                A
     A17-1B24/1D24   11           A16-1B24/1D24  11      3    A17B24                A
     A17-1B24/1D24   22           A18-1B24/1D24  22      3    A17B24                A
     A17-1B25/1D25   11           A16-1B25/1D25  11      3    A17B25                A
     A17-1B25/1D25   22           A18-1B25/1D25  22      3    A17B25                A
     A17-1B26/1D26   11           A16-1B26/1D26  11      3    A17B26                A
     A17-1B26/1D26   22           A18-1B26/1D26  22      3    A17B26                A
     A17-1B27/1D27   11           A16-1B27/1D27  11      3    A17B27                A
     A17-1B27/1D27   22           A18-1B27/1D27  22      3    A17B27                A
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ORIGIN         LEVS       DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

A17-1B28/1D28  11          A16-1B28/1D28   11     3    A17B28                A
A17-1B28/1D28  22          A18-1B28/1D28   22     3    A17B28                A

A17-1B29/1D29  11          A16-1B29/1D29   11     3    A17B29                A
A17-1B29/1D29  22          A18-1B29/1D29   22     3    A17B29                A

A17-1B30/1D30  11          A16-1B30/1D30   11     3    A17B30                A
A17-1B30/1D30  22          A18-1B30/1D30   22     3    A17B30                A

A17-1B31/1D31  11          A16-1B31/1D31   11     3    A17B31                A
A17-1B31/1D31  22          A18-1B31/1D31   22     3    A17B31                A

A17-1B33/1D33  11          A18-2A28/2C28   11     8    A17B33                A

A17-1B34/1D34  11          A17-1A13/1C13   11     5    A17B34                A

A17-1B35/1D35  11          A16-2B04/2D04   11     5    A17B35                A

A17-2A03/2C03  11          A18-2A13/2C13   11     4    A18A63                A

A17-2A05/2C05  11          A18-1A38/1C38   11     5.   A17A55                A

A17-2A07/2C07  11          A16-2A07/2C07   11     3    A17A57                A

A17-2A08/2C08  11          A16-2A08/2C08   11     3    A17A58                A

A17-2A09/2C09  11          A16-2A09/2C09   11     3    A17A59                A

A17-2A10/2C10  11          A16-2A10/2C10   11     3    A17A60                A

A17-2A11/2C11  11          A16-2A11/2C11   11     3    A17A61                A

A17-2A12/2C12  11          A16-2A12/2C12   11     3    A17A62                A

A17-2A13/2C13  11          A16-2A13/2C13   11     3    A17A63                A

A17-2A14/2C14  11          A16-2A14/2C14   11     3    A17A64                A

A17-2A17/2C17  11          A18-1A42/1C42   11     6    A18A42                A

A17-2A20/2C20  11          A18-2A25/2C25   11     3    A17A70                A

A17-2A21/2C21  11          A18-1B34/1D34   11     7    A17A71                A

A17-2A22/2C22  11          A16-2B18/2D18   11     3    A17A72                A

A17-2A25/2C25  11          A16-2A43/2C43   11     4    A17A75                A

A17-2A26/2C26  11          A15-2B14/2D14   11     4    A17A76                A

A17-2A27/2C27  11          A18-2A18/2C18   11     4    A17A77                A

A17-2A30/2C30  11          A18-2A30/2C30   11     3    A18A80                A
A17-2A30/2C30  22          A14-2A15/2C15   22     5    A18A80                A
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PAGE    73 PACK       A17                                                                                             DATE 87/05/22.
      ORIGIN        LEVS       DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE


      A17-2A31/2C31  11          A18-2A31/2C31  11     3   A18A81                 A
      A17-2A31/2C31  22          A14-2A16/2C16  22     5   A18A81                 A

      A17-2A32/2C32  11          A18-1B41/1D41  11     7   A18B41                 A

      A17-2A33/2C33  11          A18-1B17/1D17  11    10   A17A83                 A

      A17-2A34/2C34  11          A18-2B22/2D22  11     4   A18B72                 A
      A17-2A34/2C34  22          A17-1B04/1D04  22    11   A18B72                 A

      A17-2A35/2C35  11          A14-2A20*2C20  11     5   A17A85                 A
      A17-2A35/2C35  22          A19-2A35/2C35  22     4   A17A85                 A

      A17-2A36/2C36  11          A14-2A21*2C21  11     5   A17A86                 A
      A17-2A36/2C36  22          A19-2A36/2C36  22     4   A17A86                 A

      A17-2A37/2C37  11          A14-2A22*2C22  11     5   A17A87                 A
      A17-2A37/2C37  22          A19-2A37/2C37  22     4   A17A87                 A

      A17-2A38/2C38  11          A14-2A24*2C24  11     5   A17A88                 A
      A17-2A38/2C38  22          A19-2A38/2C38  22     4   A17A88                 A

      A17-2A40/2C40  11          A14-2A25*2C25  11     5   A17A90                 A
      A17-2A40/2C40  22          A19-2A40/2C40  22     4   A17A90                 A

      A17-2A41/2C41  11          A14-2A26*2C26  11     5   A17A91                 A
      A17-2A41/2C41  22          A19-2A41/2C41  22     4   A17A91                 A

      A17-2A42/2C42  11          A14-2A27*2C27  11     5   A17A92                 A
      A17-2A42/2C42  22          A19-2A42/2C42  22     4   A17A92                 A

      A17-2A43/2C43  11          A14-2A28*2C28  11     5   A17A93                 A
      A17-2A43/2C43  22          A19-2A43/2C43  22     4   A17A93                 A

      A17-2B07/2D07  11          A16-2B07/2D07  11     3   A17B57                 A

      A17-2B08/2D08  11          A16-2B08/2D08  11     3   A17B58                 A

      A17-2B09/2D09  11          A16-2B09/2D09  11     3   A17B59                 A

      A17-2B10/2D10  11          A16-2B10/2D10  11     3   A17B60                 A

      A17-2B11/2D11  11          A16-2B11/2D11  11     3   A17B61                 A

      A17-2B12/2D12  11          A16-2B12/2D12  11     3   A17B62                 A

      A17-2B13/2D13  11          A16-2B13/2D13  11     3   A17B63                 A

      A17-2B14/2D14  11          A16-2B14/2D14  11     3   A17B64                 A

      A17-2B20/2D20  11          A16-2A03/2C03  11     4   A17B70                 A

      A17-2B21/2D21  11          A16-2B31/2D31  11     4   A17B71                 A
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PAGE    74  PACK        A17                                                                                          DATE 87/05/22.
     ORIGIN         LEVS       DESTINATION     LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A17-2B22/2D22   11         A18-1A17/1C17   11     9   A17B72                A
     
     A17-2B24/2D24   11         A17-1B03/1D03   11    10   A17B74                A

     A17-2B25/2D25   11         A21-1B31/1D31   11     8   A17B75                A

     A17-2B26/2D26   11         A18-2B24/2D24   11     3   A17B76                A

     A17-2B27/2D27   11         A18-2A19/2C19   11     3   A17B77                A

     A17-2B30/2D30   11         A18-2B30/2D30   11     3   A18B80                A
     A17-2B30/2D30   22         A14-2B15/2D15   22     5   A18B80                A

     A17-2B31/2D31   11         A18-2B31/2D31   11     3   A18B81                A
     A17-2B31/2D31   22         A14-2B16/2D16   22     5   A18B81                A

     A17-2B33/2D33   11         A18-2B12/2D12   11     5   A17B83                A

     A17-2B34/2D34   11         A16-2A26/2C26   11     4   A17B84                A
     A17-2B34/2D34   22         A18-2A09/2C09   22     5   A17B84                A

     A17-2B35/2D35   11         A14-2B20*2D20   11     5   A17B85                A
     A17-2B35/2D35   22         A19-2B35/2D35   22     4   A17B85                A

     A17-2B36/2D36   11         A14-2B21*2D21   11     5   A17B86                A
     A17-2B36/2D36   22         A19-2B36/2D36   22     4   A17B86                A

     A17-2B37/2D37   11         A14-2B22*2D22   11     5   A17B87                A
     A17-2B37/2D37   22         A19-2B37/2D37   22     4   A17B87                A

     A17-2B38/2D38   11         A14-2B24*2D24   11     5   A17B88                A
     A17-2B38/2D38   22         A19-2B38/2D38   22     4   A17B88                A

     A17-2B40/2D40   11         A14-2B25*2D25   11     5   A17B90                A
     A17-2B40/2D40   22         A19-2B40/2D40   22     4   A17B90                A

     A17-2B41/2D41   11         A14-2B26*2D26   11     5   A17B91                A
     A17-2B41/2D41   22         A19-2B41/2D41   22     4   A17B91                A

     A17-2B42/2D42   11         A14-2B27*2D27   11     5   A17B92                A
     A17-2B42/2D42   22         A19-2B42/2D42   22     4   A17B92                A

     A17-2B43/2D43   11         A14-2B28*2D28   11     5   A17B93                A
     A17-2B43/2D43   22         A19-2B43/2D43   22     4   A17B93                A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A18-1A03/1C03	11	A16-1A03/1C03	11	13	A18A03			A				
A18-1A04/1C04	11	A15-1A07/1C07	11	13	A18A04			A				
A18-1A05/1C05	11	A16-1A05/1C05	11	13	A18A05			A				
A18-1A07/1C07	11	A24-1A07/1C07	11	13	A18A07			A		F		
A18-1A08/1C08	11	A16-1A08/1C08	11	4	A18A08			A				
A18-1A08/1C08	22	A19-1A08/1C08	22	3	A18A08			A				
A18-1A09/1C09	11	A16-1A09/1C09	11	4	A18A09			A				
A18-1A09/1C09	22	A19-1A09/1C09	22	3	A18A09			A				
A18-1A10/1C10	11	A16-1A10/1C10	11	4	A18A10			A				
A18-1A10/1C10	22	A19-1A10/1C10	22	3	A18A10			A				
A18-1A11/1C11	11	A16-1A11/1C11	11	4	A18A11			A				
A18-1A11/1C11	22	A19-1A11/1C11	22	3	A18A11			A				
A18-1A12/1C12	11	A16-1A12/1C12	11	4	A18A12			A				
A18-1A12/1C12	22	A19-1A12/1C12	22	3	A18A12			A				
A18-1A13/1C13	11	A16-1A13/1C13	11	4	A18A13			A				
A18-1A13/1C13	22	A19-1A13/1C13	22	3	A18A13			A				
A18-1A14/1C14	11	A16-1A14/1C14	11	4	A18A14			A				
A18-1A14/1C14	22	A19-1A14/1C14	22	3	A18A14			A				
A18-1A15/1C15	11	A16-1A15/1C15	11	4	A18A15			A				
A18-1A15/1C15	22	A19-1A15/1C15	22	3	A18A15			A				
A18-1A16/1C16	11	A16-1A16/1C16	11	4	A18A16			A				
A18-1A16/1C16	22	A19-1A16/1C16	22	3	A18A16			A				
A18-1A17/1C17	11	A17-2B22/2D22	11	9	A17B72			A				
A18-1A22/1C22	22	A23-2B19/2D19	22	9	A23B69			A				
A18-1A24/1C24	22	A17-1A24/1C24	22	3	A17A24			A				
A18-1A25/1C25	22	A17-1A25/1C25	22	3	A17A25			A				
A18-1A26/1C26	22	A17-1A26/1C26	22	3	A17A26			A				
A18-1A27/1C27	22	A17-1A27/1C27	22	3	A17A27			A				
A18-1A28/1C28	22	A17-1A28/1C28	22	3	A17A28			A				
A18-1A29/1C29	22	A17-1A29/1C29	22	3	A17A29			A				
A18-1A30/1C30	22	A17-1A30/1C30	22	3	A17A30			A				

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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A18-1A31/1C31	22	A17-1A31/1C31	22	3	A17A31			A				
A18-1A32/1C32	11	A25-1B04/1D04	11	13	A18A32			A		F		
A18-1A33/1C33	11	A15-1A22/1C22	11	5	A18A33			A				
A18-1A34/1C34	11	A15-1A35/1C35	11	4	A16A74			A				
A18-1A34/1C34	22	A16-2A24/2C24	22	7	A16A74			A				
A18-1A35/1C35	11	A16-2B43/2D43	11	9	A16B93			A				
A18-1A36/1C36	11	A15-1A20/1C20	11	5	A15A20			A				
A18-1A36/1C36	22	A16-2B42/2D42	22	9	A15A20			A				
A18-1A37/1C37	11	A24-1B05/1D05	11	13	A18A37			A				
A18-1A38/1C38	11	A17-2A05/2C05	11	5	A17A55			A				
A18-1A40/1C40	11	A17-1A12/1C12	11	5	A18A40			A				
A18-1A41/1C41	11	A15-1B04/1D04	11	7	A15B04			A				
A18-1A42/1C42	11	A17-2A17/2C17	11	6	A18A42			A				
A18-1A43/1C43	11	A16-2A22/2C22	11	6	A18A43			A				
A18-1B03/1D03	11	A16-1B03/1D03	11	13	A18B03			A				
A18-1B04/1D04	11	A20-1B04/1D04	11	13	A18B04			A				
A18-1B05/1D05	11	A21-1B05/1D05	11	13	A18B05			A				
A18-1B08/1D08	11	A16-1B08/1D08	11	4	A18B08			A				
A18-1B08/1D08	22	A19-1B08/1D08	22	3	A18B08			A				
A18-1B09/1D09	11	A16-1B09/1D09	11	4	A18B09			A				
A18-1B09/1D09	22	A19-1B09/1D09	22	3	A18B09			A				
A18-1B10/1D10	11	A16-1B10/1D10	11	4	A18B10			A				
A18-1B10/1D10	22	A19-1B10/1D10	22	3	A18B10			A				
A18-1B11/1D11	11	A16-1B11/1D11	11	4	A18B11			A				
A18-1B11/1D11	22	A19-1B11/1D11	22	3	A18B11			A				
A18-1B12/1D12	11	A16-1B12/1D12	11	4	A18B12			A				
A18-1B12/1D12	22	A19-1B12/1D12	22	3	A18B12			A				
A18-1B13/1D13	11	A16-1B13/1D13	11	4	A18B13			A				
A18-1B13/1D13	22	A19-1B13/1D13	22	3	A18B13			A				
A18-1B14/1D14	11	A16-1B14/1D14	11	4	A18B14			A				
A18-1B14/1D14	22	A19-1B14/1D14	22	3	A18B14			A				
A18-1B15/1D15	11	A16-1B15/1D15	11	4	A18B15			A				

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PAGE    77  PACK        A18                                                                                         DATE 87/05/22.
    ORIGIN          LEVS        DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE
    A18-1B15/1D15   22          A19-1B15/1D15   22     3     A18B15                A
    A18-1B16/1D16   11          A16-1B16/1D16   11     4     A18B16                A
    A18-1B16/1D16   22          A19-1B16/1D16   22     3     A18B16                A
    A18-1B17/1D17   11          A17-2A33/2C33   11    10     A17A83                A
    A18-1B22/1D22   11          A17-1A34/1C34   11     4     A17A34                A
    A18-1B24/1D24   22          A17-1B24/1D24   22     3     A17B24                A
    A18-1B25/1D25   22          A17-1B25/1D25   22     3     A17B25                A
    A18-1B26/1D26   22          A17-1B26/1D26   22     3     A17B26                A
    A18-1B27/1D27   22          A17-1B27/1D27   22     3     A17B27                A
    A18-1B28/1D28   22          A17-1B28/1D28   22     3     A17B28                A
    A18-1B29/1D29   22          A17-1B29/1D29   22     3     A17B29                A
    A18-1B30/1D30   22          A17-1B30/1D30   22     3     A17B30                A
    A18-1B31/1D31   22          A17-1B31/1D31   22     3     A17B31                A
    A18-1B32/1D32   11          A24-2B26/2D26   11     9     A18B32                A
    A18-1B33/1D33   11          A14-1B21/1D21   11     5     A18B33                A
    A18-1B34/1D34   11          A17-2A21/2C21   11     7     A17A71                A
    A18-1B35/1D35   22          A16-2A41/2C41   22     9     A15B29                A
    A18-1B36/1D36   11          A16-2B16/2D16   11     6     A16B66                A
    A18-1B37/1D37   11          A21-1A07/1C07   11    13     A18A07                A
    A18-1B38/1D38   11          A17-1A43/1C43   11     3     A17A43                A
    A18-1B40/1D40   11          A21-1A34/1C34   11     4     A21A34                A
    A18-1B41/1D41   11          A17-2A32/2C32   11     7     A18B41                A
    A18-1B42/1D42   11          A16-1A19/1C19   11     5     A16A19                A
    A18-1B43/1D43   11          A15-1B03/1D03   11     7     A15B03                A
    A18-2A03/2C03   11          A16-2A25/2C25   11     5     A18A53                A
    A18-2A04/2C04   11          A16-2B27/2D27   11     5     A16B77                A
    A18-2A05/2C05   11          A15-1A29/1C29   11     6     A15A29                A
    A18-2A05/2C05   22          A16-2B35/2D35   22     6     A15A29                A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A18-2A07/2C07	11	A15-1B14/1D14	11	8	A15B14			A				
A18-2A08/2C08	11	A15-1A14/1C14	11	8	A15A14			A				
A18-2A09/2C09	11	A22-2B16/2D16	11	5	A17B84			A				
A18-2A09/2C09	22	A17-2B34/2D34	22	5	A17B84			A				
A18-2A10/2C10	11	A20-1A04/1C04	11	13	A18A60			A				
A18-2A11/2C11	11	A22-1A04/1C04	11	13	A18A61			A				
A18-2A12/2C12	11	A14-1A21/1C21	11	13	A18A62			A				
A18-2A13/2C13	11	A17-2A03/2C03	11	4	A18A63			A				
A18-2A14/2C14	11	A16-1A21/1C21	11	8	A18A64			A				
A18-2A15/2C15	11	A16-2A40/2C40	11	5	A18A65			A				
A18-2A16/2C16	11	A22-1B03/1D03	11	13	A18A66			A				
A18-2A17/2C17	11	A20-2B14/2D14	11	4	A20B64			A				
A18-2A18/2C18	11	A17-2A27/2C27	11	4	A17A77			A				
A18-2A19/2C19	11	A17-2B27/2D27	11	3	A17B77			A				
A18-2A20/2C20	11	A16-2A37/2C37	11	5	A18A70			A				
A18-2A21/2C21	11	A15-2B13/2D13	11	4	A15B63			A				
A18-2A22/2C22	11	A21-1A38/1C38	11	7	A21A38			A				
A18-2A24/2C24	22	A16-2A38/2C38	22	4	A18A74			A				
A18-2A25/2C25	11	A17-2A20/2C20	11	3	A17A70			A				
A18-2A26/2C26	11	A16-2A20/2C20	11	4	A16A70			A				
A18-2A27/2C27	11	A15-2A09/2C09	11	5	A15A59			A				
A18-2A28/2C28	11	A17-1B33/1D33	11	8	A17B33			A				
A18-2A29/2C29	11	A22-1B05/1D05	11	13	A18A79			A		F		
A18-2A30/2C30	11	A17-2A30/2C30	11	3	A18A80			A				
A18-2A30/2C30	22	A20-2A30/2C30	22	4	A18A80			A				
A18-2A31/2C31	11	A17-2A31/2C31	11	3	A18A81			A				
A18-2A31/2C31	22	A20-2A31/2C31	22	4	A18A81			A				
A18-2A32/2C32	11	A20-1A05/1C05	11	13	A18A82			A		F		
A18-2A33/2C33	11	A25-1A05/1C05	11	13	A18A83			A		F		

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A18-2A34/2C34	11	A19-2A34/2C34	11	3	A18A84			A		
A18-2A34/2C34	22	A16-2A34/2C34	22	4	A18A84			A		
A18-2B03/2D03	11	A15-1A03/1C03	11	8	A18B53			A		
A18-2B04/2D04	11	A16-2B29/2D29	11	5	A16B79			A		
A18-2B04/2D04	22	A22-1A40/1C40	22	5	A16B79			A		
A18-2B05/2D05	22	A16-2B32/2D32	22	5	A15B30			A		
A18-2B07/2D07	11	A16-1A35/1C35	11	6	A18B57			A		
A18-2B08/2D08	11	A22-1B35/1D35	11	6	A22B35			A		
A18-2B09/2D09	11	A16-1A04/1C04	11	13	A18B59			A		
A18-2B10/2D10	11	A15-2A04/2C04	11	5	A18B60			A		
A18-2B11/2D11	11	A25-1A04/1C04	11	13	A18B61			A		
A18-2B12/2D12	11	A17-2B33/2D33	11	5	A17B83			A		
A18-2B13/2D13	11	A20-1B03/1D03	11	13	A18B63			A		
A18-2B14/2D14	11	A21-1B03/1D03	11	13	A18B64			A		
A18-2B15/2D15	11	A16-2B28/2D28	11	4	A22B54			A		
A18-2B15/2D15	22	A22-2B04/2D04	22	5	A22B54			A		
A18-2B16/2D16	11	A15-1B22/1D22	11	8	A18B66			A		
A18-2B17/2D17	11	A15-1A19/1C19	11	8	A18B67			A		
A18-2B18/2D18	11	A16-2B17/2D17	11	4	A18B68			A		
A18-2B19/2D19	11	A25-1B03/1D03	11	13	A18B69			A		
A18-2B20/2D20	11	A14-1B20/1D20	11	13	A18B70			A		
A18-2B21/2D21	11	A20-1A03/1C03	11	13	A18B71			A		
A18-2B22/2D22	11	A17-2A34/2C34	11	4	A18B72			A		
A18-2B24/2D24	11	A17-2B26/2D26	11	3	A17B76			A		
A18-2B25/2D25	11	A15-2B10/2D10	11	5	A18B75			A		
A18-2B26/2D26	11	A22-1A03/1C03	11	13	A18B76			A		
A18-2B27/2D27	11	A25-1A03/1C03	11	13	A18B77			A		
A18-2B28/2D28	11	A14-1A20/1C20	11	13	A18B78			A		

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PAGE    80  PACK        A18                                                                                       DATE 87/05/22.
     ORIGIN         LEVS       DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE
     A18-2B29/2D29  11           A17-1A32/1C32  11      8   A18B79                  A

     A18-2B30/2D30  11           A17-2B30/2D30  11      3   A18B80                  A
     A18-2B30/2D30  22           A20-2B30/2D30  22      4   A18B80                  A

     A18-2B31/2D31  11           A17-2B31/2D31  11      3   A18B81                  A
     A18-2B31/2D31  22           A20-2B31/2D31  22      4   A18B81                  A

     A18-2B32/2D32  11           A14-2B17/2D17  11      5   A18B82                  A
     A18-2B32/2D32  22           A20-2B32/2D32  22      4   A18B82                  A

     A18-2B33/2D33  11           A16-2B33/2D33  11      4   A18B83                  A
     A18-2B33/2D33  22           A19-2B33/2D33  22      3   A18B83                  A

     A18-2B34/2D34  11           A16-2B34/2D34  11      4   A18B84                  A
     A18-2B34/2D34  22           A19-2B34/2D34  22      3   A18B84                  A
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PAGE    81  PACK        A19                                                                                              DATE 87/05/22.
     ORIGIN        LEVS      DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A19-1A07/1C07  11        A20-1B10/1D10   11     3    A20B10                 A

     A19-1A08/1C08  11        A21-1A08/1C08   11     4    A18A08                 A
     A19-1A08/1C08  22        A18-1A08/1C08   22     3    A18A08                 A

     A19-1A09/1C09  11        A21-1A09/1C09   11     4    A18A09                 A
     A19-1A09/1C09  22        A18-1A09/1C09   22     3    A18A09                 A

     A19-1A10/1C10  11        A21-1A10/1C10   11     4    A18A10                 A
     A19-1A10/1C10  22        A18-1A10/1C10   22     3    A18A10                 A

     A19-1A11/1C11  11        A21-1A11/1C11   11     4    A18A11                 A
     A19-1A11/1C11  22        A18-1A11/1C11   22     3    A18A11                 A

     A19-1A12/1C12  11        A21-1A12/1C12   11     4    A18A12                 A
     A19-1A12/1C12  22        A18-1A12/1C12   22     3    A18A12                 A

     A19-1A13/1C13  11        A21-1A13/1C13   11     4    A18A13                 A
     A19-1A13/1C13  22        A18-1A13/1C13   22     3    A18A13                 A

     A19-1A14/1C14  11        A21-1A14/1C14   11     4    A18A14                 A
     A19-1A14/1C14  22        A18-1A14/1C14   22     3    A18A14                 A

     A19-1A15/1C15  11        A21-1A15/1C15   11     4    A18A15                 A
     A19-1A15/1C15  22        A18-1A15/1C15   22     3    A18A15                 A

     A19-1A16/1C16  11        A21-1A16/1C16   11     4    A18A16                 A
     A19-1A16/1C16  22        A18-1A16/1C16   22     3    A18A16                 A

     A19-1A17/1C17  11        A20-1A17/1C17   11     3    A20A17                 A

     A19-1A18/1C18  11        A20-1A18/1C18   11     3    A20A18                 A

     A19-1A19/1C19  11        A20-1A19/1C19   11     3    A20A19                 A

     A19-1A20/1C20  11        A20-1A20/1C20   11     3    A19A20                 A

     A19-1A21/1C21  11        A20-1A21/1C21   11     3    A20A21                 A

     A19-1A22/1C22  11        A20-1A22/1C22   11     3    A20A22                 A

     A19-1A24/1C24  11        A20-1A24/1C24   11     3    A20A24                 A

     A19-1A25/1C25  11        A20-1A25/1C25   11     3    A20A25                 A

     A19-1A26/1C26  11        A20-1A26/1C26   11     3    A20A26                 A

     A19-1A27/1C27  11        A20-1A27/1C27   11     3    A20A27                 A

     A19-1A28/1C28  11        A20-1A28/1C28   11     3    A20A28                 A

     A19-1A29/1C29  11        A20-1A29/1C29   11     3    A20A29                 A
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ORIGIN          LEVS      DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ---------- QSE

A19-1A30/1C30   11          A20-1A30/1C30  11     3    A19A30                A
A19-1A31/1C31   11          A20-1A31/1C31  11     3    A19A31                A
A19-1A32/1C32   11          A20-1A32/1C32  11     3    A19A32                A
A19-1A33/1C33   11          A20-1A33/1C33  11     3    A19A33                A
A19-1A34/1C34   11          A20-1A34/1C34  11     3    A19A34                A
A19-1A35/1C35   11          A20-1A35/1C35  11     3    A19A35                A
A19-1A36/1C36   11          A20-1A36/1C36  11     3    A19A36                A
A19-1A37/1C37   11          A20-1A37/1C37  11     3    A19A37                A
A19-1A38/1C38   11          A20-1A38/1C38  11     3    A19A38                A
A19-1A40/1C40   11          A20-1A40/1C40  11     3    A20A40                A
A19-1A41/1C41   11          A20-1A41/1C41  11     3    A20A41                A
A19-1A42/1C42   11          A20-1A42/1C42  11     3    A19A42                A
A19-1A43/1C43   11          A20-1A43/1C43  11     3    A20A43                A

A19-1B08/1D08   11          A21-1B08/1D08  11     4    A18B08                A
A19-1B08/1D08   22          A18-1B08/1D08  22     3    A18B08                A

A19-1B09/1D09   11          A21-1B09/1D09  11     4    A18B09                A
A19-1B09/1D09   22          A18-1B09/1D09  22     3    A18B09                A

A19-1B10/1D10   11          A21-1B10/1D10  11     4    A18B10                A
A19-1B10/1D10   22          A18-1B10/1D10  22     3    A18B10                A

A19-1B11/1D11   11          A21-1B11/1D11  11     4    A18B11                A
A19-1B11/1D11   22          A18-1B11/1D11  22     3    A18B11                A

A19-1B12/1D12   11          A21-1B12/1D12  11     4    A18B12                A
A19-1B12/1D12   22          A18-1B12/1D12  22     3    A18B12                A

A19-1B13/1D13   11          A21-1B13/1D13  11     4    A18B13                A
A19-1B13/1D13   22          A18-1B13/1D13  22     3    A18B13                A

A19-1B14/1D14   11          A21-1B14/1D14  11     4    A18B14                A
A19-1B14/1D14   22          A18-1B14/1D14  22     3    A18B14                A

A19-1B15/1D15   11          A21-1B15/1D15  11     4    A18B15                A
A19-1B15/1D15   22          A18-1B15/1D15  22     3    A18B15                A

A19-1B16/1D16   11          A21-1B16/1D16  11     4    A18B16                A
A19-1B16/1D16   22          A18-1B16/1D16  22     3    A18B16                A

A19-1B17/1D17   11          A20-1B17/1D17  11     3    A20B17                A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A19-1B18/1D18	11	A20-1B18/1D18	11	3	A20B18			A				
A19-1B19/1D19	11	A20-1B19/1D19	11	3	A20B19			A				
A19-1B20/1D20	11	A20-1B20/1D20	11	3	A19B20			A				
A19-1B21/1D21	11	A20-1B21/1D21	11	3	A19B21			A				
A19-1B22/1D22	11	A20-1B22/1D22	11	3	A20B22			A				
A19-1B24/1D24	11	A20-1B24/1D24	11	3	A20B24			A				
A19-1B25/1D25	11	A20-1B25/1D25	11	3	A20B25			A				
A19-1B26/1D26	11	A20-1B26/1D26	11	3	A20B26			A				
A19-1B27/1D27	11	A20-1B27/1D27	11	3	A20B27			A				
A19-1B28/1D28	11	A20-1B28/1D28	11	3	A20B28			A				
A19-1B29/1D29	11	A20-1B29/1D29	11	3	A20B29			A				
A19-1B30/1D30	11	A20-1B30/1D30	11	3	A19B30			A				
A19-1B31/1D31	11	A20-1B31/1D31	11	3	A19B31			A				
A19-1B32/1D32	11	A20-1B32/1D32	11	3	A19B32			A				
A19-1B33/1D33	11	A20-1B33/1D33	11	3	A19B33			A				
A19-1B34/1D34	11	A20-1B34/1D34	11	3	A19B34			A				
A19-1B35/1D35	11	A20-1B35/1D35	11	3	A19B35			A				
A19-1B36/1D36	11	A20-1B36/1D36	11	3	A19B36			A				
A19-1B37/1D37	11	A20-1B37/1D37	11	3	A19B37			A				
A19-1B38/1D38	11	A20-1B38/1D38	11	3	A19B38			A				
A19-1B40/1D40	11	A20-1B40/1D40	11	3	A20B40			A				
A19-1B41/1D41	11	A20-1B41/1D41	11	3	A20B41			A				
A19-1B42/1D42	11	A20-1B42/1D42	11	3	A19B42			A				
A19-1B43/1D43	11	A20-1B43/1D43	11	3	A20B43			A				
A19-2A03/2C03	11	A20-2A03/2C03	11	3	A20A53			A				
A19-2A04/2C04	11	A20-2A04/2C04	11	3	A20A54			A				
A19-2A05/2C05	11	A20-2A05/2C05	11	3	A20A55			A				

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A19-2A07/2C07	11	A20-2A07/2C07	11	3	A20A57			A				
A19-2A08/2C08	11	A20-2A08/2C08	11	3	A20A58			A				
A19-2A09/2C09	11	A20-2A09/2C09	11	3	A19A59			A				
A19-2A10/2C10	11	A20-2A10/2C10	11	3	A20A60			A				
A19-2A11/2C11	11	A20-2A11/2C11	11	3	A20A61			A				
A19-2A12/2C12	11	A20-2A12/2C12	11	3	A19A62			A				
A19-2A13/2C13	11	A19-2B13/2D13	11	3	A22B38			A				
A19-2A14/2C14	11	A19-2B14/2D14	11	3	A22B38			A				
A19-2A14/2C14	22	A19-2B13/2D13	22	3	A22B38			A				
A19-2A15/2C15	11	A19-2B15/2D15	11	3	A22B38			A				
A19-2A15/2C15	22	A19-2B14/2D14	22	3	A22B38			A				
A19-2A16/2C16	11	A19-2B16/2D16	11	3	A22B38			A				
A19-2A16/2C16	22	A19-2B15/2D15	22	3	A22B38			A				
A19-2A17/2C17	11	A19-2B17/2D17	11	3	A22B38			A				
A19-2A17/2C17	22	A19-2B16/2D16	22	3	A22B38			A				
A19-2A18/2C18	11	A19-2B18/2D18	11	3	A22B38			A				
A19-2A18/2C18	22	A19-2B17/2D17	22	3	A22B38			A				
A19-2A19/2C19	11	A19-2B19/2D19	11	3	A22B38			A				
A19-2A19/2C19	22	A19-2B18/2D18	22	3	A22B38			A				
A19-2A20/2C20	11	A19-2B20/2D20	11	3	A22B38			A				
A19-2A20/2C20	22	A19-2B19/2D19	22	3	A22B38			A				
A19-2A21/2C21	11	A20-2A21/2C21	11	3	A20A71			A				
A19-2A22/2C22	11	A20-2A22/2C22	11	3	A20A72			A				
A19-2A24/2C24	11	A20-2A24/2C24	11	3	A20A74			A				
A19-2A25/2C25	11	A14-1B41/1D41	11	7	A19A75			A				
A19-2A26/2C26	11	A14-1B40/1D40	11	8	A19A76			A				
A19-2A27/2C27	11	A20-2A27/2C27	11	3	A20A77			A				
A19-2A28/2C28	11	A20-2A28/2C28	11	3	A20A78			A				
A19-2A33/2C33	11	A20-1A10/1C10	11	10	A20A10			A				
A19-2A34/2C34	11	A18-2A34/2C34	11	3	A18A84			A				
A19-2A34/2C34	22	A21-2A34/2C34	22	4	A18A84			A				

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PAGE    85  PACK        A19                                                                                                DATE 87/05/22.
     ORIGIN         LEVS        DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ---------- QSE

     A19-2A35/2C35  11          A21-2A35/2C35    11      4    A17A85                 A
     A19-2A35/2C35  22          A17-2A35/2C35    22      4    A17A85                 A

     A19-2A36/2C36  11          A21-2A36/2C36    11      4    A17A86                 A
     A19-2A36/2C36  22          A17-2A36/2C36    22      4    A17A86                 A

     A19-2A37/2C37  11          A21-2A37/2C37    11      4    A17A87                 A
     A19-2A37/2C37  22          A17-2A37/2C37    22      4    A17A87                 A

     A19-2A38/2C38  11          A21-2A38/2C38    11      4    A17A88                 A
     A19-2A38/2C38  22          A17-2A38/2C38    22      4    A17A88                 A

     A19-2A40/2C40  11          A21-2A40/2C40    11      4    A17A90                 A
     A19-2A40/2C40  22          A17-2A40/2C40    22      4    A17A90                 A

     A19-2A41/2C41  11          A21-2A41/2C41    11      4    A17A91                 A
     A19-2A41/2C41  22          A17-2A41/2C41    22      4    A17A91                 A

     A19-2A42/2C42  11          A21-2A42/2C42    11      4    A17A92                 A
     A19-2A42/2C42  22          A17-2A42/2C42    22      4    A17A92                 A

     A19-2A43/2C43  11          A21-2A43/2C43    11      4    A17A93                 A
     A19-2A43/2C43  22          A17-2A43/2C43    22      4    A17A93                 A

     A19-2B03/2D03  11          A20-2B03/2D03    11      3    A20B53                 A

     A19-2B04/2D04  11          A20-2B04/2D04    11      3    A20B54                 A

     A19-2B05/2D05  11          A20-2B05/2D05    11      3    A20B55                 A

     A19-2B07/2D07  11          A20-2B07/2D07    11      3    A20B57                 A

     A19-2B08/2D08  11          A20-2B08/2D08    11      3    A20B58                 A

     A19-2B09/2D09  11          A20-2B09/2D09    11      3    A19B59                 A

     A19-2B10/2D10  11          A20-2B10/2D10    11      3    A20B60                 A

     A19-2B11/2D11  11          A20-2B11/2D11    11      3    A20B61                 A

     A19-2B12/2D12  11          A20-2B12/2D12    11      3    A19B62                 A

     A19-2B13/2D13  11          A19-2A13/2C13    11      3    A22B38                 A
     A19-2B13/2D13  22          A19-2A14/2C14    22      3    A22B38                 A

     A19-2B14/2D14  11          A19-2A14/2C14    11      3    A22B38                 A
     A19-2B14/2D14  22          A19-2A15/2C15    22      3    A22B38                 A

     A19-2B15/2D15  11          A19-2A15/2C15    11      3    A22B38                 A
     A19-2B15/2D15  22          A19-2A16/2C16    22      3    A22B38                 A

     A19-2B16/2D16  11          A19-2A16/2C16    11      3    A22B38                 A
     A19-2B16/2D16  22          A19-2A17/2C17    22      3    A22B38                 A
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PAGE     86  PACK        A19                                                                                        DATE 87/05/22.
     ORIGIN        LEVS       DESTINATION     LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A19-2B17/2D17  11          A19-2A17/2C17  11     3   A22B38                  A
     A19-2B17/2D17  22          A19-2A18/2C18  22     3   A22B38                  A

     A19-2B18/2D18  11          A19-2A18/2C18  11     3   A22B38                  A
     A19-2B18/2D18  22          A19-2A19/2C19  22     3   A22B38                  A

     A19-2B19/2D19  11          A19-2A19/2C19  11     3   A22B38                  A
     A19-2B19/2D19  22          A19-2A20/2C20  22     3   A22B38                  A

     A19-2B20/2D20  11          A19-2A20/2C20  11     3   A22B38                  A
     A19-2B20/2D20  22          A22-1B38/1D38  22     7   A22B38                  A

     A19-2B21/2D21  11          A20-2B21/2D21  11     3   A20B71                  A

     A19-2B22/2D22  11          A20-2B22/2D22  11     3   A20B72                  A

     A19-2B24/2D24  11          A20-2B24/2D24  11     3   A19B74                  A

     A19-2B25/2D25  11          A14-1A41/1C41  11     8   A19B75                  A

     A19-2B26/2D26  11          A14-1A40/1C40  11     8   A19B76                  A

     A19-2B27/2D27  11          A20-2B27/2D27  11     3   A20B77                  A

     A19-2B28/2D28  11          A20-2B28/2D28  11     3   A19B78                  A

     A19-2B33/2D33  11          A21-2B33/2D33  11     4   A18B83                  A
     A19-2B33/2D33  22          A18-2B33/2D33  22     3   A18B83                  A

     A19-2B34/2D34  11          A21-2B34/2D34  11     4   A18B84                  A
     A19-2B34/2D34  22          A18-2B34/2D34  22     3   A18B84                  A

     A19-2B35/2D35  11          A21-2B35/2D35  11     4   A17B85                  A
     A19-2B35/2D35  22          A17-2B35/2D35  22     4   A17B85                  A

     A19-2B36/2D36  11          A21-2B36/2D36  11     4   A17B86                  A
     A19-2B36/2D36  22          A17-2B36/2D36  22     4   A17B86                  A

     A19-2B37/2D37  11          A21-2B37/2D37  11     4   A17B87                  A
     A19-2B37/2D37  22          A17-2B37/2D37  22     4   A17B87                  A

     A19-2B38/2D38  11          A21-2B38/2D38  11     4   A17B88                  A
     A19-2B38/2D38  22          A17-2B38/2D38  22     4   A17B88                  A

     A19-2B40/2D40  11          A21-2B40/2D40  11     4   A17B90                  A
     A19-2B40/2D40  22          A17-2B40/2D40  22     4   A17B90                  A

     A19-2B41/2D41  11          A21-2B41/2D41  11     4   A17B91                  A
     A19-2B41/2D41  22          A17-2B41/2D41  22     4   A17B91                  A

     A19-2B42/2D42  11          A21-2B42/2D42  11     4   A17B92                  A
     A19-2B42/2D42  22          A17-2B42/2D42  22     4   A17B92                  A
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PAGE     87  PACK        A19                                                                                   DATE 87/05/22.
     ORIGIN         LEVS       DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A19-2B43/2D43  11           A21-2B43/2D43  11      4    A17B93                A
     A19-2B43/2D43  22           A17-2B43/2D43  22      4    A17B93                A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	---------- DESCRIPTION ----------	QSE
A20-1A03/1C03	11	A18-2B21/2D21	11	13	A18B71			A				
A20-1A04/1C04	11	A18-2A10/2C10	11	13	A18A60			A				
A20-1A05/1C05	11	A18-2A32/2C32	11	13	A18A82			A		F		
A20-1A10/1C10	11	A19-2A33/2C33	11	10	A20A10			A				
A20-1A17/1C17	11	A19-1A17/1C17	11	3	A20A17			A				
A20-1A18/1C18	11	A19-1A18/1C18	11	3	A20A18			A				
A20-1A19/1C19	11	A19-1A19/1C19	11	3	A20A19			A				
A20-1A20/1C20	11	A19-1A20/1C20	11	3	A19A20			A				
A20-1A21/1C21	11	A19-1A21/1C21	11	3	A20A21			A				
A20-1A22/1C22	11	A19-1A22/1C22	11	3	A20A22			A				
A20-1A24/1C24	11	A19-1A24/1C24	11	3	A20A24			A				
A20-1A25/1C25	11	A19-1A25/1C25	11	3	A20A25			A				
A20-1A26/1C26	11	A19-1A26/1C26	11	3	A20A26			A				
A20-1A27/1C27	11	A19-1A27/1C27	11	3	A20A27			A				
A20-1A28/1C28	11	A19-1A28/1C28	11	3	A20A28			A				
A20-1A29/1C29	11	A19-1A29/1C29	11	3	A20A29			A				
A20-1A30/1C30	11	A19-1A30/1C30	11	3	A19A30			A				
A20-1A31/1C31	11	A19-1A31/1C31	11	3	A19A31			A				
A20-1A32/1C32	11	A19-1A32/1C32	11	3	A19A32			A				
A20-1A33/1C33	11	A19-1A33/1C33	11	3	A19A33			A				
A20-1A34/1C34	11	A19-1A34/1C34	11	3	A19A34			A				
A20-1A35/1C35	11	A19-1A35/1C35	11	3	A19A35			A				
A20-1A36/1C36	11	A19-1A36/1C36	11	3	A19A36			A				
A20-1A37/1C37	11	A19-1A37/1C37	11	3	A19A37			A				
A20-1A38/1C38	11	A19-1A38/1C38	11	3	A19A38			A				
A20-1A40/1C40	11	A19-1A40/1C40	11	3	A20A40			A				
A20-1A41/1C41	11	A19-1A41/1C41	11	3	A20A41			A				

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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A20-1A42/1C42	11	A19-1A42/1C42	11	3	A19A42			A		
A20-1A43/1C43	11	A19-1A43/1C43	11	3	A20A43			A		
A20-1B03/1D03	11	A18-2B13/2D13	11	13	A18B63			A		
A20-1B04/1D04	11	A18-1B04/1D04	11	13	A18B04			A		
A20-1B10/1D10	11	A19-1A07/1C07	11	3	A20B10			A		
A20-1B17/1D17	11	A19-1B17/1D17	11	3	A20B17			A		
A20-1B18/1D18	11	A19-1B18/1D18	11	3	A20B18			A		
A20-1B19/1D19	11	A19-1B19/1D19	11	3	A20B19			A		
A20-1B20/1D20	11	A19-1B20/1D20	11	3	A19B20			A		
A20-1B21/1D21	11	A19-1B21/1D21	11	3	A19B21			A		
A20-1B22/1D22	11	A19-1B22/1D22	11	3	A20B22			A		
A20-1B24/1D24	11	A19-1B24/1D24	11	3	A20B24			A		
A20-1B25/1D25	11	A19-1B25/1D25	11	3	A20B25			A		
A20-1B26/1D26	11	A19-1B26/1D26	11	3	A20B26			A		
A20-1B27/1D27	11	A19-1B27/1D27	11	3	A20B27			A		
A20-1B28/1D28	11	A19-1B28/1D28	11	3	A20B28			A		
A20-1B29/1D29	11	A19-1B29/1D29	11	3	A20B29			A		
A20-1B30/1D30	11	A19-1B30/1D30	11	3	A19B30			A		
A20-1B31/1D31	11	A19-1B31/1D31	11	3	A19B31			A		
A20-1B32/1D32	11	A19-1B32/1D32	11	3	A19B32			A		
A20-1B33/1D33	11	A19-1B33/1D33	11	3	A19B33			A		
A20-1B34/1D34	11	A19-1B34/1D34	11	3	A19B34			A		
A20-1B35/1D35	11	A19-1B35/1D35	11	3	A19B35			A		
A20-1B36/1D36	11	A19-1B36/1D36	11	3	A19B36			A		
A20-1B37/1D37	11	A19-1B37/1D37	11	3	A19B37			A		
A20-1B38/1D38	11	A19-1B38/1D38	11	3	A19B38			A		
A20-1B40/1D40	11	A19-1B40/1D40	11	3	A20B40			A		

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A20-1B41/1D41	11	A19-1B41/1D41	11	3	A20B41			A		
A20-1B42/1D42	11	A19-1B42/1D42	11	3	A19B42			A		
A20-1B43/1D43	11	A19-1B43/1D43	11	3	A20B43			A		
A20-2A03/2C03	11	A19-2A03/2C03	11	3	A20A53			A		
A20-2A04/2C04	11	A19-2A04/2C04	11	3	A20A54			A		
A20-2A05/2C05	11	A19-2A05/2C05	11	3	A20A55			A		
A20-2A07/2C07	11	A19-2A07/2C07	11	3	A20A57			A		
A20-2A08/2C08	11	A19-2A08/2C08	11	3	A20A58			A		
A20-2A09/2C09	11	A19-2A09/2C09	11	3	A19A59			A		
A20-2A10/2C10	11	A19-2A10/2C10	11	3	A20A60			A		
A20-2A11/2C11	11	A19-2A11/2C11	11	3	A20A61			A		
A20-2A12/2C12	11	A19-2A12/2C12	11	3	A19A62			A		
A20-2A13/2C13	11	A14-1A38/1C38	11	7	A14A38			A		
A20-2A14/2C14	11	A14-2A13/2C13	11	6	A14A63			A		
A20-2A21/2C21	11	A19-2A21/2C21	11	3	A20A71			A		
A20-2A22/2C22	11	A19-2A22/2C22	11	3	A20A72			A		
A20-2A24/2C24	11	A19-2A24/2C24	11	3	A20A74			A		
A20-2A27/2C27	11	A19-2A27/2C27	11	3	A20A77			A		
A20-2A28/2C28	11	A19-2A28/2C28	11	3	A20A78			A		
A20-2A30/2C30	22	A18-2A30/2C30	22	4	A18A80			A		
A20-2A31/2C31	22	A18-2A31/2C31	22	4	A18A81			A		
A20-2B03/2D03	11	A19-2B03/2D03	11	3	A20B53			A		
A20-2B04/2D04	11	A19-2B04/2D04	11	3	A20B54			A		
A20-2B05/2D05	11	A19-2B05/2D05	11	3	A20B55			A		
A20-2B07/2D07	11	A19-2B07/2D07	11	3	A20B57			A		
A20-2B08/2D08	11	A19-2B08/2D08	11	3	A20B58			A		
A20-2B09/2D09	11	A19-2B09/2D09	11	3	A19B59			A		

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A20-2B10/2D10	11	A19-2B10/2D10	11	3	A20B60			A		
A20-2B11/2D11	11	A19-2B11/2D11	11	3	A20B61			A		
A20-2B12/2D12	11	A19-2B12/2D12	11	3	A19B62			A		
A20-2B13/2D13	11	A14-1B38/1D38	11	7	A20B63			A		
A20-2B14/2D14	11	A18-2A17/2C17	11	4	A20B64			A		
A20-2B21/2D21	11	A19-2B21/2D21	11	3	A20B71			A		
A20-2B22/2D22	11	A19-2B22/2D22	11	3	A20B72			A		
A20-2B24/2D24	11	A19-2B24/2D24	11	3	A19B74			A		
A20-2B27/2D27	11	A19-2B27/2D27	11	3	A20B77			A		
A20-2B28/2D28	11	A19-2B28/2D28	11	3	A19B78			A		
A20-2B30/2D30	22	A18-2B30/2D30	22	4	A18B80			A		
A20-2B31/2D31	11	A23-2B31/2D31	11	4	A18B81			A		
A20-2B31/2D31	22	A18-2B31/2D31	22	4	A18B81			A		
A20-2B32/2D32	22	A18-2B32/2D32	22	4	A18B82			A		

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A21-1A03/1C03	11	A22-2A31/2C31	11	11	A22A81			A				
A21-1A05/1C05	11	A22-2B32/2D32	11	11	A22B82			A				
A21-1A07/1C07	11	A18-1B37/1D37	11	13	A18A07			A				
A21-1A08/1C08	11	A19-1A08/1C08	11	4	A18A08			A				
A21-1A08/1C08	22	A25-1A08/1C08	22	5	A18A08			A				
A21-1A09/1C09	11	A19-1A09/1C09	11	4	A18A09			A				
A21-1A09/1C09	22	A25-1A09/1C09	22	5	A18A09			A				
A21-1A10/1C10	11	A19-1A10/1C10	11	4	A18A10			A				
A21-1A10/1C10	22	A25-1A10/1C10	22	5	A18A10			A				
A21-1A11/1C11	11	A19-1A11/1C11	11	4	A18A11			A				
A21-1A11/1C11	22	A25-1A11/1C11	22	5	A18A11			A				
A21-1A12/1C12	11	A19-1A12/1C12	11	4	A18A12			A				
A21-1A12/1C12	22	A26-1A08/1C08	22	6	A18A12			A				
A21-1A13/1C13	11	A19-1A13/1C13	11	4	A18A13			A				
A21-1A13/1C13	22	A26-1A09/1C09	22	6	A18A13			A				
A21-1A14/1C14	11	A19-1A14/1C14	11	4	A18A14			A				
A21-1A14/1C14	22	A26-1A10/1C10	22	6	A18A14			A				
A21-1A15/1C15	11	A19-1A15/1C15	11	4	A18A15			A				
A21-1A15/1C15	22	A26-1A11/1C11	22	6	A18A15			A				
A21-1A16/1C16	11	A19-1A16/1C16	11	4	A18A16			A				
A21-1A16/1C16	22	A25-1A16/1C16	22	5	A18A16			A				
A21-1A17/1C17	11	A22-2A28/2C28	11	9	A22A78			A				
A21-1A18/1C18	11	A22-2A27/2C27	11	9	A22A77			A				
A21-1A19/1C19	11	A22-2A30/2C30	11	9	A22A80			A				
A21-1A20/1C20	11	A22-2B30/2D30	11	9	A22B80			A				
A21-1A22/1C22	11	A27-1A09/1C09	11	6	A21A22			A				
A21-1A24/1C24	11	A27-1A28/1C28	11	6	A21A24			A				
A21-1A25/1C25	11	A27-1A29/1C29	11	6	A21A25			A				
A21-1A26/1C26	11	A27-1A31/1C31	11	6	A21A26			A				
A21-1A27/1C27	11	A27-1A32/1C32	11	6	A21A27			A				
A21-1A28/1C28	11	A27-1A33/1C33	11	6	A21A28			A				

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PAGE    93  PACK        A21                                                                                   DATE 87/05/22.
     ORIGIN          LEVS       DESTINATION      LEVS  LTH    SIGNAL   CBL   COLORS   REV   GA   TYPE ---------- DESCRIPTION ----------- QSE

     A21-1A29/1C29   11          A22-2B25/2D25   11      8    A22B75                   A

     A21-1A30/1C30   11          A22-2B26/2D26   11      8    A22B76                   A

     A21-1A31/1C31   11          A22-2B27/2D27   11      8    A22B77                   A

     A21-1A34/1C34   11          A18-1B40/1D40   11      4    A21A34                   A

     A21-1A37/1C37   11          A23-2A26/2C26   11      7    A23A76                   A

     A21-1A38/1C38   11          A18-2A22/2C22   11      7    A21A38                   A

     A21-1A40/1C40   11          A24-2B25/2D25   11      7    A21A40                   A

     A21-1B03/1D03   11          A18-2B14/2D14   11     13    A18B64                   A

     A21-1B04/1D04   11          A22-2B31/2D31   11     11    A22B81                   A

     A21-1B05/1D05   11          A18-1B05/1D05   11     13    A18B05                   A

     A21-1B07/1D07   11          A22-2B33/2D33   11     11    A22B83                   A

     A21-1B08/1D08   11          A19-1B08/1D08   11      4    A18B08                   A
     A21-1B08/1D08   22          A25-1B08/1D08   22      5    A18B08                   A

     A21-1B09/1D09   11          A19-1B09/1D09   11      4    A18B09                   A
     A21-1B09/1D09   22          A25-1B09/1D09   22      5    A18B09                   A

     A21-1B10/1D10   11          A19-1B10/1D10   11      4    A18B10                   A
     A21-1B10/1D10   22          A25-1B10/1D10   22      5    A18B10                   A

     A21-1B11/1D11   11          A19-1B11/1D11   11      4    A18B11                   A
     A21-1B11/1D11   22          A25-1B11/1D11   22      5    A18B11                   A

     A21-1B12/1D12   11          A19-1B12/1D12   11      4    A18B12                   A
     A21-1B12/1D12   22          A26-1B08/1D08   22      6    A18B12                   A

     A21-1B13/1D13   11          A19-1B13/1D13   11      4    A18B13                   A
     A21-1B13/1D13   22          A26-1B09/1D09   22      6    A18B13                   A

     A21-1B14/1D14   11          A19-1B14/1D14   11      4    A18B14                   A
     A21-1B14/1D14   22          A26-1B10/1D10   22      6    A18B14                   A

     A21-1B15/1D15   11          A19-1B15/1D15   11      4    A18B15                   A
     A21-1B15/1D15   22          A26-1B11/1D11   22      6    A18B15                   A

     A21-1B16/1D16   11          A19-1B16/1D16   11      4    A18B16                   A
     A21-1B16/1D16   22          A26-1A16/1C16   22      5    A18B16                   A

     A21-1B17/1D17   11          A22-2B28/2D28   11      9    A22B78                   A

     A21-1B18/1D18   11          A22-2B29/2D29   11      9    A22B79                   A

     A21-1B19/1D19   11          A22-2A29/2C29   11      9    A22A79                   A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	---------- DESCRIPTION ----------	QSE
A21-1B20/1D20	11	A22-1A43/1C43	11	5	A22A43			A				
A21-1B21/1D21	11	A24-1B24/1D24	11	4	A26A88			A				
A21-1B22/1D22	11	A23-2A34/2C34	11	9	A26A13			A				
A21-1B24/1D24	11	A24-1B21/1D21	11	4	A21B24			A				
A21-1B25/1D25	11	A24-1B22/1D22	11	4	A21B25			A				
A21-1B26/1D26	11	A27-1A16/1C16	11	6	A21B26			A				
A21-1B27/1D27	11	A27-1A17/1C17	11	6	A21B27			A				
A21-1B28/1D28	11	A27-1A18/1C18	11	6	A21B28			A				
A21-1B29/1D29	11	A22-2A26/2C26	11	8	A22A76			A				
A21-1B30/1D30	11	A27-1A34/1C34	11	6	A21B30			A				
A21-1B31/1D31	11	A17-2B25/2D25	11	8	A17B75			A				
A21-1B33/1D33	11	A24-2B34/2D34	11	8	A21B33			A				
A21-1B37/1D37	11	A14-2B11/2D11	11	8	A21B37			A				
A21-1B38/1D38	11	A25-1B12/1D12	11	6	A21B38			A				
A21-2A15/2C15	11	A22-1A32/1C32	11	6	A22A32			A				
A21-2A34/2C34	11	A22-2A34/2C34	11	3	A18A84			A				
A21-2A34/2C34	22	A19-2A34/2C34	22	4	A18A84			A				
A21-2A35/2C35	11	A19-2A35/2C35	11	4	A17A85			A				
A21-2A35/2C35	22	A22-2A35/2C35	22	3	A17A85			A				
A21-2A36/2C36	11	A19-2A36/2C36	11	4	A17A86			A				
A21-2A36/2C36	22	A22-2A36/2C36	22	3	A17A86			A				
A21-2A37/2C37	11	A19-2A37/2C37	11	4	A17A87			A				
A21-2A37/2C37	22	A22-2A37/2C37	22	3	A17A87			A				
A21-2A38/2C38	11	A19-2A38/2C38	11	4	A17A88			A				
A21-2A38/2C38	22	A22-2A38/2C38	22	3	A17A88			A				
A21-2A40/2C40	11	A19-2A40/2C40	11	4	A17A90			A				
A21-2A40/2C40	22	A22-2A40/2C40	22	3	A17A90			A				
A21-2A41/2C41	11	A19-2A41/2C41	11	4	A17A91			A				
A21-2A41/2C41	22	A22-2A41/2C41	22	3	A17A91			A				
A21-2A42/2C42	11	A19-2A42/2C42	11	4	A17A92			A				
A21-2A42/2C42	22	A22-2A42/2C42	22	3	A17A92			A				

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PAGE    95  PACK        A21                                                                               DATE 87/05/22.
     ORIGIN          LEVS       DESTINATION       LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A21-2A43/2C43   11           A19-2A43/2C43   11     4     A17A93                A
     A21-2A43/2C43   22           A22-2A43/2C43   22     3     A17A93                A

     A21-2B05/2D05   11           A21-2B06/2D06   11     3     A21B05                A

     A21-2B06/2D06   11           A21-2B05/2D05   11     3     A21B05                A

     A21-2B15/2D15   11           A22-2B15/2D15   11     3     A22B65                A

     A21-2B33/2D33   11           A19-2B33/2D33   11     4     A18B83                A
     A21-2B33/2D33   22           A25-2B33/2D33   22     5     A18B83                A

     A21-2B34/2D34   11           A19-2B34/2D34   11     4     A18B84                A
     A21-2B34/2D34   22           A25-2B34/2D34   22     5     A18B84                A

     A21-2B35/2D35   11           A19-2B35/2D35   11     4     A17B85                A
     A21-2B35/2D35   22           A22-2B35/2D35   22     3     A17B85                A

     A21-2B36/2D36   11           A19-2B36/2D36   11     4     A17B86                A
     A21-2B36/2D36   22           A22-2B36/2D36   22     3     A17B86                A

     A21-2B37/2D37   11           A19-2B37/2D37   11     4     A17B87                A
     A21-2B37/2D37   22           A22-2B37/2D37   22     3     A17B87                A

     A21-2B38/2D38   11           A19-2B38/2D38   11     4     A17B88                A
     A21-2B38/2D38   22           A22-2B38/2D38   22     3     A17B88                A

     A21-2B40/2D40   11           A19-2B40/2D40   11     4     A17B90                A
     A21-2B40/2D40   22           A22-2B40/2D40   22     3     A17B90                A

     A21-2B41/2D41   11           A19-2B41/2D41   11     4     A17B91                A
     A21-2B41/2D41   22           A22-2B41/2D41   22     3     A17B91                A

     A21-2B42/2D42   11           A19-2B42/2D42   11     4     A17B92                A
     A21-2B42/2D42   22           A22-2B42/2D42   22     3     A17B92                A

     A21-2B43/2D43   11           A19-2B43/2D43   11     4     A17B93                A
     A21-2B43/2D43   22           A22-2B43/2D43   22     3     A17B93                A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A22-1A03/1C03	11	A18-2B26/2D26	11	13	A18B76			A				
A22-1A04/1C04	11	A18-2A11/2C11	11	13	A18A61			A				
A22-1A05/1C05	11	A24-1A27/1C27	11	5	A22A05			A				
A22-1A17/1C17	11	A27-1B21/1D21	11	6	A22A17			A				
A22-1A21/1C21	11	A23-1B33/1D33	11	4	A23B33			A				
A22-1A22/1C22	11	A24-2A22/2C22	11	8	A25A64			A				
A22-1A24/1C24	11	A23-1A24/1C24	11	3	A23A24			A				
A22-1A25/1C25	11	A23-1A25/1C25	11	3	A23A25			A				
A22-1A26/1C26	11	A23-1A26/1C26	11	3	A23A26			A				
A22-1A27/1C27	11	A23-1A27/1C27	11	3	A23A27			A				
A22-1A28/1C28	11	A23-1A28/1C28	11	3	A23A28			A				
A22-1A29/1C29	11	A23-1A29/1C29	11	3	A23A29			A				
A22-1A30/1C30	11	A23-1A30/1C30	11	3	A23A30			A				
A22-1A31/1C31	11	A23-1A31/1C31	11	3	A23A31			A				
A22-1A32/1C32	11	A21-2A15/2C15	11	6	A22A32			A				
A22-1A33/1C33	11	A23-1B37/1D37	11	3	A23B37			A				
A22-1A33/1C33	22	A25-2B16/2D16	22	7	A23B37			A				
A22-1A34/1C34	11	A27-1B30/1D30	11	6	A22A34			A				
A22-1A35/1C35	11	A25-2B32/2D32	11	8	A22A35			A				
A22-1A36/1C36	11	A23-1A41/1C41	11	3	A23A41			A				
A22-1A36/1C36	22	A25-2B17/2D17	22	7	A23A41			A				
A22-1A37/1C37	11	A23-1A42/1C42	11	3	A23A42			A				
A22-1A37/1C37	22	A25-2B18/2D18	22	7	A23A42			A				
A22-1A38/1C38	11	A25-2A18/2C18	11	7	A22A38			A				
A22-1A40/1C40	11	A24-2B24/2D24	11	7	A16B79			A				
A22-1A40/1C40	22	A18-2B04/2D04	22	5	A16B79			A				
A22-1A42/1C42	11	A23-1B42/1D42	11	3	A23B42			A				
A22-1A43/1C43	11	A21-1B20/1D20	11	5	A22A43			A				
A22-1B03/1D03	11	A18-2A16/2C16	11	13	A18A66			A				

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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A22-1B04/1D04	11	A24-1B35/1D35	11	6	A24B35			A				
A22-1B05/1D05	11	A18-2A29/2C29	11	13	A18A79			A		F		
A22-1B05/1D05	22	A25-1B05/1D05	22	3	A18A79			A		F		
A22-1B07/1D07	11	A23-2B25/2D25	11	10	A23B75			A				
A22-1B08/1D08	11	A24-2A07/2C07	11	8	A22B08			A				
A22-1B17/1D17	11	A25-1A42/1C42	11	5	A22B17			A				
A22-1B21/1D21	11	A24-1A42/1C42	11	5	A24A42			A				
A22-1B24/1D24	11	A23-1B24/1D24	11	3	A23B24			A				
A22-1B25/1D25	11	A23-1B25/1D25	11	3	A23B25			A				
A22-1B26/1D26	11	A23-1B26/1D26	11	3	A23B26			A				
A22-1B27/1D27	11	A23-1B27/1D27	11	3	A23B27			A				
A22-1B28/1D28	11	A23-1B28/1D28	11	3	A23B28			A				
A22-1B29/1D29	11	A23-1B29/1D29	11	3	A23B29			A				
A22-1B30/1D30	11	A23-1B30/1D30	11	3	A23B30			A				
A22-1B31/1D31	11	A23-1B31/1D31	11	3	A23B31			A				
A22-1B33/1D33	11	A25-1A13/1C13	11	5	A25A13			A				
A22-1B34/1D34	11	A27-1B33/1D33	11	6	A22B34			A				
A22-1B35/1D35	11	A18-2B08/2D08	11	6	A22B35			A				
A22-1B36/1D36	11	A23-1B41/1D41	11	3	A23B41			A				
A22-1B36/1D36	22	A25-2A17/2C17	22	7	A23B41			A				
A22-1B37/1D37	11	A16-2B19/2D19	11	8	A22B37			A				
A22-1B38/1D38	22	A19-2B20/2D20	22	7	A22B38			A				
A22-1B40/1D40	11	A24-2A41/2C41	11	8	A22B40			A				
A22-1B41/1D41	11	A23-1A38/1C38	11	3	A23A38			A				
A22-1B42/1D42	11	A23-2B05/2D05	11	4	A23B55			A				
A22-1B43/1D43	11	A23-1A34/1C34	11	3	A23A34			A				
A22-2A03/2C03	11	A27-2A41/2C41	11	7	A22A53			A				
A22-2A04/2C04	11	A27-2B33/2D33	11	7	A22A54			A				

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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A22-2A05/2C05	11	A24-2A25/2C25	11	5	A22A55			A		
A22-2A07/2C07	11	A23-2A07/2C07	11	3	A23A57			A		
A22-2A08/2C08	11	A23-2A08/2C08	11	3	A23A58			A		
A22-2A09/2C09	11	A23-2A09/2C09	11	3	A23A59			A		
A22-2A10/2C10	11	A23-2A10/2C10	11	3	A23A60			A		
A22-2A11/2C11	11	A23-2A11/2C11	11	3	A23A61			A		
A22-2A12/2C12	11	A23-2A12/2C12	11	3	A23A62			A		
A22-2A13/2C13	11	A23-2A13/2C13	11	3	A23A63			A		
A22-2A14/2C14	11	A23-2A14/2C14	11	3	A23A64			A		
A22-2A16/2C16	11	A24-1A22/1C22	11	8	A24A22			A		
A22-2A17/2C17	11	A16-1B36/1D36	11	8	A16B36			A		
A22-2A26/2C26	11	A21-1B29/1D29	11	8	A22A76			A		
A22-2A27/2C27	11	A21-1A18/1C18	11	9	A22A77			A		
A22-2A28/2C28	11	A21-1A17/1C17	11	9	A22A78			A		
A22-2A29/2C29	11	A21-1B19/1D19	11	9	A22A79			A		
A22-2A30/2C30	11	A21-1A19/1C19	11	9	A22A80			A		
A22-2A31/2C31	11	A21-1A03/1C03	11	11	A22A81			A		
A22-2A32/2C32	11	A16-1A20/1C20	11	10	A22A82			A		
A22-2A33/2C33	11	A24-2B41/2D41	11	4	A22A83			A		
A22-2A34/2C34	11	A21-2A34/2C34	11	3	A18A84			A		
A22-2A34/2C34	22	A25-2A34/2C34	22	4	A18A84			A		
A22-2A35/2C35	11	A23-2A35/2C35	11	3	A17A85			A		
A22-2A35/2C35	22	A21-2A35/2C35	22	3	A17A85			A		
A22-2A36/2C36	11	A23-2A36/2C36	11	3	A17A86			A		
A22-2A36/2C36	22	A21-2A36/2C36	22	3	A17A86			A		
A22-2A37/2C37	11	A23-2A37/2C37	11	3	A17A87			A		
A22-2A37/2C37	22	A21-2A37/2C37	22	3	A17A87			A		
A22-2A38/2C38	11	A23-2A38/2C38	11	3	A17A88			A		
A22-2A38/2C38	22	A21-2A38/2C38	22	3	A17A88			A		

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PAGE    99  PACK       A22                                                                                          DATE 87/05/22.
     ORIGIN        LEVS      DESTINATION     LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A22-2A40/2C40  11         A23-2A40/2C40  11     3   A17A90                  A
     A22-2A40/2C40  22         A21-2A40/2C40  22     3   A17A90                  A

     A22-2A41/2C41  11         A23-2A41/2C41  11     3   A17A91                  A
     A22-2A41/2C41  22         A21-2A41/2C41  22     3   A17A91                  A

     A22-2A42/2C42  11         A23-2A42/2C42  11     3   A17A92                  A
     A22-2A42/2C42  22         A21-2A42/2C42  22     3   A17A92                  A

     A22-2A43/2C43  11         A23-2A43/2C43  11     3   A17A93                  A
     A22-2A43/2C43  22         A21-2A43/2C43  22     3   A17A93                  A

     A22-2B03/2D03  11         A27-2B43/2D43  11     7   A22B53                  A

     A22-2B04/2D04  22         A18-2B15/2D15  22     5   A22B54                  A

     A22-2B07/2D07  11         A23-2B07/2D07  11     3   A23B57                  A

     A22-2B08/2D08  11         A23-2B08/2D08  11     3   A23B58                  A

     A22-2B09/2D09  11         A23-2B09/2D09  11     3   A23B59                  A

     A22-2B10/2D10  11         A23-2B10/2D10  11     3   A23B60                  A

     A22-2B11/2D11  11         A23-2B11/2D11  11     3   A23B61                  A

     A22-2B12/2D12  11         A23-2B12/2D12  11     3   A23B62                  A

     A22-2B13/2D13  11         A23-2B13/2D13  11     3   A23B63                  A

     A22-2B14/2D14  11         A23-2B14/2D14  11     3   A23B64                  A

     A22-2B15/2D15  11         A21-2B15/2D15  11     3   A22B65                  A

     A22-2B16/2D16  11         A18-2A09/2C09  11     5   A17B84                  A

     A22-2B25/2D25  11         A21-1A29/1C29  11     8   A22B75                  A

     A22-2B26/2D26  11         A21-1A30/1C30  11     8   A22B76                  A

     A22-2B27/2D27  11         A21-1A31/1C31  11     8   A22B77                  A

     A22-2B28/2D28  11         A21-1B17/1D17  11     9   A22B78                  A

     A22-2B29/2D29  11         A21-1B18/1D18  11     9   A22B79                  A

     A22-2B30/2D30  11         A21-1A20/1C20  11     9   A22B80                  A

     A22-2B31/2D31  11         A21-1B04/1D04  11    11   A22B81                  A

     A22-2B32/2D32  11         A21-1A05/1C05  11    11   A22B82                  A

     A22-2B33/2D33  11         A21-1B07/1D07  11    11   A22B83                  A
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PAGE    100  PACK        A22                                                                                                  DATE 27/05/22.
     ORIGIN          LEVS       DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE
     A22-2B34/2D34    11          A25-1A12/1C12   11    10    A22B84                 A

     A22-2B35/2D35    11          A23-2B35/2D35   11     3    A17B85                 A
     A22-2B35/2D35    22          A21-2B35/2D35   22     3    A17B85                 A

     A22-2B36/2D36    11          A23-2B36/2D36   11     3    A17B86                 A
     A22-2B36/2D36    22          A21-2B36/2D36   22     3    A17B86                 A

     A22-2B37/2D37    11          A23-2B37/2D37   11     3    A17B87                 A
     A22-2B37/2D37    22          A21-2B37/2D37   22     3    A17B87                 A

     A22-2B38/2D38    11          A23-2B38/2D38   11     3    A17B88                 A
     A22-2B38/2D38    22          A21-2B38/2D38   22     3    A17B88                 A

     A22-2B40/2D40    11          A23-2B40/2D40   11     3    A17B90                 A
     A22-2B40/2D40    22          A21-2B40/2D40   22     3    A17B90                 A

     A22-2B41/2D41    11          A23-2B41/2D41   11     3    A17B91                 A
     A22-2B41/2D41    22          A21-2B41/2D41   22     3    A17B91                 A

     A22-2B42/2D42    11          A23-2B42/2D42   11     3    A17B92                 A
     A22-2B42/2D42    22          A21-2B42/2D42   22     3    A17B92                 A

     A22-2B43/2D43    11          A23-2B43/2D43   11     3    A17B93                 A
     A22-2B43/2D43    22          A21-2B43/2D43   22     3    A17B93                 A
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PAGE   101  PACK       A23                                                                              DATE 87/05/22.
    ORIGIN         LEVS       DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE


    A23-1A12/1C12  11          A25-1B18/1D18   11     4    A25B18                A

    A23-1A13/1C13  11          A23-1B34/1D34   11     5    A23B34                A

    A23-1A24/1C24  11          A22-1A24/1C24   11     3    A23A24                A
    A23-1A24/1C24  22          A25-1A24/1C24   22     4    A23A24                A

    A23-1A25/1C25  11          A22-1A25/1C25   11     3    A23A25                A
    A23-1A25/1C25  22          A25-1A25/1C25   22     4    A23A25                A

    A23-1A26/1C26  11          A22-1A26/1C26   11     3    A23A26                A
    A23-1A26/1C26  22          A25-1A26/1C26   22     4    A23A26                A

    A23-1A27/1C27  11          A22-1A27/1C27   11     3    A23A27                A
    A23-1A27/1C27  22          A25-1A27/1C27   22     4    A23A27                A

    A23-1A28/1C28  11          A22-1A28/1C28   11     3    A23A28                A
    A23-1A28/1C28  22          A26-1A24/1C24   22     4    A23A28                A

    A23-1A29/1C29  11          A22-1A29/1C29   11     3    A23A29                A
    A23-1A29/1C29  22          A26-1A25/1C25   22     4    A23A29                A

    A23-1A30/1C30  11          A22-1A30/1C30   11     3    A23A30                A
    A23-1A30/1C30  22          A26-1A26/1C26   22     4    A23A30                A

    A23-1A31/1C31  11          A22-1A31/1C31   11     3    A23A31                A
    A23-1A31/1C31  22          A26-1A27/1C27   22     4    A23A31                A

    A23-1A32/1C32  11          A25-1A07/1C07   11     5    A25A07                A

    A23-1A34/1C34  11          A22-1B43/1D43   11     3    A23A34                A

    A23-1A35/1C35  11          A27-1A22/1C22   11     5    A23A35                A

    A23-1A38/1C38  11          A22-1B41/1D41   11     3    A23A38                A

    A23-1A40/1C40  11          A25-1B41/1D41   11     4    A23A40                A

    A23-1A41/1C41  11          A22-1A36/1C36   11     3    A23A41                A

    A23-1A42/1C42  11          A22-1A37/1C37   11     3    A23A42                A

    A23-1A43/1C43  11          A24-2B40/2D40   11     8    A23A43                A

    A23-1B03/1D03  11          A23-2B27/2D27   11    10    A23B77                A

    A23-1B24/1D24  11          A22-1B24/1D24   11     3    A23B24                A
    A23-1B24/1D24  22          A25-1B24/1D24   22     4    A23B24                A

    A23-1B25/1D25  11          A22-1B25/1D25   11     3    A23B25                A
    A23-1B25/1D25  22          A25-1B25/1D25   22     4    A23B25                A

    A23-1B26/1D26  11          A22-1B26/1D26   11     3    A23B26                A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A23-1B26/1D26	22	A25-1B26/1D26	22	4	A23B26			A		
A23-1B27/1D27	11	A22-1B27/1D27	11	3	A23B27			A		
A23-1B27/1D27	22	A25-1B27/1D27	22	4	A23B27			A		
A23-1B28/1D28	11	A22-1B28/1D28	11	3	A23B28			A		
A23-1B28/1D28	22	A26-1B24/1D24	22	4	A23B28			A		
A23-1B29/1D29	11	A22-1B29/1D29	11	3	A23B29			A		
A23-1B29/1D29	22	A26-1B25/1D25	22	4	A23B29			A		
A23-1B30/1D30	11	A22-1B30/1D30	11	3	A23B30			A		
A23-1B30/1D30	22	A26-1B26/1D26	22	4	A23B30			A		
A23-1B31/1D31	11	A22-1B31/1D31	11	3	A23B31			A		
A23-1B31/1D31	22	A26-1B27/1D27	22	4	A23B31			A		
A23-1B33/1D33	11	A22-1A21/1C21	11	4	A23B33			A		
A23-1B34/1D34	11	A23-1A13/1C13	11	5	A23B34			A		
A23-1B35/1D35	11	A25-1A35/1C35	11	3	A23B35			A		
A23-1B37/1D37	11	A22-1A33/1C33	11	3	A23B37			A		
A23-1B38/1D38	11	A26-1B41/1D41	11	4	A23B38			A		
A23-1B41/1D41	11	A22-1B36/1D36	11	3	A23B41			A		
A23-1B42/1D42	11	A22-1A42/1C42	11	3	A23B42			A		
A23-1B42/1D42	22	A24-2A40/2C40	22	8	A23B42			A		
A23-2A03/2C03	11	A25-1A21/1C21	11	6	A25A21			A		
A23-2A05/2C05	11	A24-2B08/2D08	11	3	A23A55			A		
A23-2A07/2C07	11	A22-2A07/2C07	11	3	A23A57			A		
A23-2A07/2C07	22	A25-2A07/2C07	22	4	A23A57			A		
A23-2A08/2C08	11	A22-2A08/2C08	11	3	A23A58			A		
A23-2A08/2C08	22	A25-2A08/2C08	22	4	A23A58			A		
A23-2A09/2C09	11	A22-2A09/2C09	11	3	A23A59			A		
A23-2A09/2C09	22	A25-2A09/2C09	22	4	A23A59			A		
A23-2A10/2C10	11	A22-2A10/2C10	11	3	A23A60			A		
A23-2A10/2C10	22	A25-2A10/2C10	22	4	A23A60			A		
A23-2A11/2C11	11	A22-2A11/2C11	11	3	A23A61			A		
A23-2A11/2C11	22	A26-2A07/2C07	22	4	A23A61			A		
A23-2A12/2C12	11	A22-2A12/2C12	11	3	A23A62			A		
A23-2A12/2C12	22	A26-2A08/2C08	22	4	A23A62			A		

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ORIGIN          LEVS      DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

A23-2A13/2C13   11         A22-2A13/2C13   11     3    A23A63                A
A23-2A13/2C13   22         A26-2A09/2C09   22     4    A23A63                A

A23-2A14/2C14   11         A22-2A14/2C14   11     3    A23A64                A
A23-2A14/2C14   22         A26-2A10/2C10   22     4    A23A64                A

A23-2A17/2C17   11         A25-2A13/2C13   11     4    A25A63                A

A23-2A20/2C20   11         A25-2B03/2D03   11     5    A23A70                A

A23-2A21/2C21   11         A25-2B13/2D13   11     4    A23A71                A

A23-2A22/2C22   11         A25-2B15/2D15   11     4    A23A72                A

A23-2A24/2C24   11         A27-2A43/2C43   11     6    A23A74                A

A23-2A25/2C25   11         A27-2B20/2D20   11     5    A23A75                A

A23-2A26/2C26   11         A21-1A37/1C37   11     7    A23A76                A

A23-2A27/2C27   11         A25-2B36/2D36   11     4    A23A77                A

A23-2A33/2C33   11         A27-1A21/1C21   11    10    A23A83                A

A23-2A34/2C34   11         A21-1B22/1D22   11     9    A26A13                A
A23-2A34/2C34   22         A24-2A03/2C03   22     6    A26A13                A

A23-2A35/2C35   11         A22-2A35/2C35   11     3    A17A85                A

A23-2A36/2C36   11         A22-2A36/2C36   11     3    A17A86                A

A23-2A37/2C37   11         A22-2A37/2C37   11     3    A17A87                A

A23-2A38/2C38   11         A22-2A38/2C38   11     3    A17A88                A

A23-2A40/2C40   11         A22-2A40/2C40   11     3    A17A90                A

A23-2A41/2C41   11         A22-2A41/2C41   11     3    A17A91                A

A23-2A42/2C42   11         A22-2A42/2C42   11     3    A17A92                A

A23-2A43/2C43   11         A22-2A43/2C43   11     3    A17A93                A

A23-2B05/2D05   11         A22-1B42/1D42   11     4    A23B55                A
A23-2B05/2D05   22         A25-1A41/1C41   22     5    A23B55                A

A23-2B07/2D07   11         A22-2B07/2D07   11     3    A23B57                A
A23-2B07/2D07   22         A25-2B07/2D07   22     4    A23B57                A

A23-2B08/2D08   11         A22-2B08/2D08   11     3    A23B58                A
A23-2B08/2D08   22         A25-2B08/2D08   22     4    A23B58                A

A23-2B09/2D09   11         A22-2B09/2D09   11     3    A23B59                A
A23-2B09/2D09   22         A25-2B09/2D09   22     4    A23B59                A
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PAGE   104 PACK        A23                                                                                           DATE 87/05/22.
      ORIGIN         LEVS       DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

      A23-2B10/2D10  11         A22-2B10/2D10  11     3   A23B60               A
      A23-2B10/2D10  22         A25-2B10/2D10  22     4   A23B60               A

      A23-2B11/2D11  11         A22-2B11/2D11  11     3   A23B61               A
      A23-2B11/2D11  22         A26-2B07/2D07  22     4   A23B61               A

      A23-2B12/2D12  11         A22-2B12/2D12  11     3   A23B62               A
      A23-2B12/2D12  22         A26-2B08/2D08  22     4   A23B62               A

      A23-2B13/2D13  11         A22-2B13/2D13  11     3   A23B63               A
      A23-2B13/2D13  22         A26-2B09/2D09  22     4   A23B63               A

      A23-2B14/2D14  11         A22-2B14/2D14  11     3   A23B64               A
      A23-2B14/2D14  22         A26-2B10/2D10  22     4   A23B64               A

      A23-2B19/2D19  11         A16-2A21/2C21  11     7   A23B69               A
      A23-2B19/2D19  22         A18-1A22/1C22  22     9   A23B69               A

      A23-2B20/2D20  11         A25-1B42/1D42  11     6   A23B70               A

      A23-2B21/2D21  11         A27-2B11/2D11  11     5   A23B71               A

      A23-2B22/2D22  11         A24-1A41/1C41  11     6   A23B72               A

      A23-2B24/2D24  11         A27-2B17/2D17  11     5   A23B74               A

      A23-2B25/2D25  11         A22-1B07/1D07  11    10   A23B75               A

      A23-2B26/2D26  11         A27-2B35/2D35  11     5   A23B76               A

      A23-2B27/2D27  11         A23-1B03/1D03  11    10   A23B77               A

      A23-2B31/2D31  11         A20-2B31/2D31  11     4   A18B81               A
      A23-2B31/2D31  22         A25-2B31/2D31  22     4   A18B81               A

      A23-2B33/2D33  11         A27-1B22/1D22  11    10   A23B83               A

      A23-2B34/2D34  11         A27-2B36/2D36  11     5   A23B84               A

      A23-2B35/2D35  11         A22-2B35/2D35  11     3   A17B85               A

      A23-2B36/2D36  11         A22-2B36/2D36  11     3   A17B86               A

      A23-2B37/2D37  11         A22-2B37/2D37  11     3   A17B87               A

      A23-2B38/2D38  11         A22-2B38/2D38  11     3   A17B88               A

      A23-2B40/2D40  11         A22-2B40/2D40  11     3   A17B90               A

      A23-2B41/2D41  11         A22-2B41/2D41  11     3   A17B91               A

      A23-2B42/2D42  11         A22-2B42/2D42  11     3   A17B92               A
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PAGE   105  PACK        A23                                                                                    DATE 87/05/22.
     ORIGIN          LEVS       DESTINATION     LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE
     A23-2B43/2D43   11           A22-2B43/2D43  11     3   A17B93                 A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A24-1A07/1C07	11	A18-1A07/1C07	11	13	A18A07			A		F		
A24-1A21/1C21	11	A25-1A31/1C31	11	4	A25A31			A				
A24-1A22/1C22	11	A22-2A16/2C16	11	8	A24A22			A				
A24-1A27/1C27	11	A22-1A05/1C05	11	5	A22A05			A				
A24-1A32/1C32	11	A27-1A30/1C30	11	4	A24A32			A				
A24-1A33/1C33	11	A25-1A43/1C43	11	4	A25A43			A				
A24-1A36/1C36	11	A25-1B43/1D43	11	4	A25B43			A				
A24-1A40/1C40	11	A25-2A40/2C40	11	8	A25A90			A				
A24-1A41/1C41	11	A23-2B22/2D22	11	6	A23B72			A				
A24-1A42/1C42	11	A22-1B21/1D21	11	5	A24A42			A				
A24-1A42/1C42	22	A25-1A22/1C22	22	5	A24A42			A				
A24-1B05/1D05	11	A18-1A37/1C37	11	13	A18A37			A				
A24-1B21/1D21	11	A21-1B24/1D24	11	4	A21B24			A				
A24-1B22/1D22	11	A21-1B25/1D25	11	4	A21B25			A				
A24-1B24/1D24	11	A21-1B21/1D21	11	4	A26A88			A				
A24-1B24/1D24	22	A26-2A38/2C38	22	10	A26A88			A				
A24-1B25/1D25	11	A27-2B31/2D31	11	9	A24B25			A				
A24-1B26/1D26	11	A26-2A31/2C31	11	9	A24B26			A				
A24-1B32/1D32	11	A25-2A15/2C15	11	6	A25A65			A				
A24-1B35/1D35	11	A22-1B04/1D04	11	6	A24B35			A				
A24-1B36/1D36	11	A25-1B38/1D38	11	3	A25B38			A				
A24-1B40/1D40	11	A25-1A28/1C28	11	4	A25A83			A				
A24-1B43/1D43	11	A25-2B14/2D14	11	5	A24B43			A				
A24-2A03/2C03	11	A26-1A13/1C13	11	7	A26A13			A				
A24-2A03/2C03	22	A23-2A34/2C34	22	6	A26A13			A				
A24-2A04/2C04	11	A27-1A12/1C12	11	8	A24A54			A				
A24-2A07/2C07	11	A22-1B08/1D08	11	8	A22B08			A				
A24-2A08/2C08	11	A27-1B13/1D13	11	8	A27B13			A				

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ---------- QSE
A24-2A09/2C09	11	A25-2A30/2C30	11	5	A25A80			A		
A24-2A10/2C10	11	A26-1B26/1D26	11	7	A23B30			A		
A24-2A11/2C11	11	A25-1A38/1C38	11	5	A25A38			A		
A24-2A12/2C12	11	A25-1A40/1C40	11	5	A24A62			A		
A24-2A13/2C13	11	A25-1A30/1C30	11	6	A25A30			A		
A24-2A14/2C14	11	A26-1B25/1D25	11	7	A23B29			A		
A24-2A15/2C15	11	A26-1B24/1D24	11	7	A23B28			A		
A24-2A16/2C16	11	A26-1B28/1D28	11	7	A26B28			A		
A24-2A17/2C17	11	A25-2B37/2D37	11	5	A25B87			A		
A24-2A18/2C18	11	A25-2A37/2C37	11	4	A25A87			A		
A24-2A19/2C19	11	A25-1A32/1C32	11	7	A25A32			A		
A24-2A22/2C22	11	A22-1A22/1C22	11	8	A25A64			A		
A24-2A22/2C22	22	A25-2A14/2C14	22	3	A25A64			A		
A24-2A25/2C25	11	A22-2A05/2C05	11	5	A22A55			A		
A24-2A25/2C25	22	A25-1B40/1D40	22	7	A22A55			A		
A24-2A26/2C26	22	A27-1B27/1D27	22	8	A23B27			A		
A24-2A27/2C27	22	A27-1B26/1D26	22	9	A23B26			A		
A24-2A28/2C28	11	A25-1B28/1D28	11	8	A25B28			A		
A24-2A29/2C29	11	A25-1A37/1C37	11	7	A25A37			A		
A24-2A30/2C30	11	A27-2A17/2C17	11	5	A27A67			A		
A24-2A31/2C31	22	A27-1B24/1D24	22	9	A23B24			A		
A24-2A32/2C32	22	A27-1A24/1C24	22	9	A23A24			A		
A24-2A33/2C33	11	A26-2B30/2D30	11	4	A26B80			A		
A24-2A35/2C35	11	A25-2A42/2C42	11	3	A25A92			A		
A24-2A36/2C36	11	A25-1A33/1C33	11	8	A24A86			A		
A24-2A37/2C37	11	A25-2A31/2C31	11	3	A24A87			A		
A24-2A38/2C38	11	A25-1B07/1D07	11	11	A25B07			A		
A24-2A40/2C40	22	A23-1B42/1D42	22	8	A23B42			A		

PAGE 108 PACK A24 DATE 87/05/22.

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A24-2A41/2C41	11	A22-1B40/1D40	11	8	A22B40			A		
A24-2A42/2C42	22	A27-1B21/1D21	22	10	A22A17			A		
A24-2A43/2C43	11	A27-2B12/2D12	11	6	A24A93			A		
A24-2B03/2D03	11	A25-2B38/2D38	11	6	A24B53			A		
A24-2B04/----		A24-2D04/----			GRNDXX			A		
A24-2B05/2D05	11	A25-2A32/2C32	11	5	A24B55			A		
A24-2B08/2D08	11	A23-2A05/2C05	11	3	A23A55			A		
A24-2B09/2D09	11	A26-1B27/1D27	11	6	A23B31			A		
A24-2B10/2D10	11	A26-1A27/1C27	11	7	A23A31			A		
A24-2B11/2D11	11	A26-1A26/1C26	11	7	A23A30			A		
A24-2B12/2D12	11	A25-2B40/2D40	11	5	A24B62			A		
A24-2B13/2D13	11	A25-2A43/2C43	11	6	A24B63			A		
A24-2B14/2D14	11	A25-1B30/1D30	11	7	A25B30			A		
A24-2B15/2D15	11	A26-1A25/1C25	11	7	A23A29			A		
A24-2B16/2D16	11	A26-1A24/1C24	11	7	A23A28			A		
A24-2B17/2D17	11	A25-2B30/2D30	11	4	A25B80			A		
A24-2B18/----		A24-2D18/----			GRNDXX			A		
A24-2B21/----		A24-2D21/----			GRNDXX			A		
A24-2B22/2D22	11	A27-2A05/2C05	11	5	A24B72			A		
A24-2B24/2D24	11	A22-1A40/1C40	11	7	A16B79			A		
A24-2B25/2D25	11	A21-1A40/1C40	11	7	A21A40			A		
A24-2B26/2D26	11	A18-1B32/1D32	11	9	A18B32			A		
A24-2B27/2D27	22	A27-1A27/1C27	22	8	A23A27			A		
A24-2B28/2D28	22	A27-1A26/1C26	22	9	A23A26			A		
A24-2B30/2D30	22	A27-1B25/1D25	22	9	A23B25			A		
A24-2B31/2D31	22	A27-1A25/1C25	22	9	A23A25			A		
A24-2B32/2D32	11	A27-2B13/2D13	11	5	A27B63			A		

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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION -----------	QSE
A24-2B33/2D33	11	A27-2B03/2D03	11	6	A27B53			A			
A24-2B34/2D34	11	A21-1B33/1D33	11	8	A21B33			A			
A24-2B35/2D35	11	A25-2A41/2C41	11	3	A25A91			A			
A24-2B36/2D36	11	A25-1B33/1D33	11	8	A24B86			A			
A24-2B37/2D37	11	A25-1A29/1C29	11	9	A25A29			A			
A24-2B38/2D38	11	A27-1B35/1D35	11	9	A24B88			A			
A24-2B40/2D40	11	A23-1A43/1C43	11	8	A23A43			A			
A24-2B41/2D41	11	A22-2A33/2C33	11	4	A22A83			A			
A24-2B41/2D41	22	A25-2A16/2C16	22	5	A22A83			A			
A24-2B42/2D42	11	A27-2A12/2C12	11	6	A24B92			A			
A24-2B43/2D43	11	A27-1B18/1D18	11	11	A24B93			A			

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A25-1A03/1C03	11	A18-2B27/2D27	11	13	A18B77			A				
A25-1A04/1C04	11	A18-2B11/2D11	11	13	A18B61			A				
A25-1A05/1C05	11	A18-2A33/2C33	11	13	A18A83			A		F		
A25-1A05/1C05	22	A26-1A05/1C05	22	3	A18A83			A		F		
A25-1A07/1C07	11	A23-1A32/1C32	11	5	A25A07			A				
A25-1A08/1C08	22	A21-1A08/1C08	22	5	A18A08			A				
A25-1A09/1C09	22	A21-1A09/1C09	22	5	A18A09			A				
A25-1A10/1C10	22	A21-1A10/1C10	22	5	A18A10			A				
A25-1A11/1C11	22	A21-1A11/1C11	22	5	A18A11			A				
A25-1A12/1C12	11	A22-2B34/2D34	11	10	A22B84			A				
A25-1A12/1C12	22	A26-1A12/1C12	22	3	A22B84			A				
A25-1A13/1C13	11	A22-1B33/1D33	11	5	A25A13			A				
A25-1A14/1C14	11	A25-1A19/1C19	11	3	A25A14			A				
A25-1A15/1C15	11	A27-2B26/2D26	11	9	A25A15			A				
A25-1A16/1C16	22	A21-1A16/1C16	22	5	A18A16			A				
A25-1A17/1C17	11	A27-2B34/2D34	11	10	A25A17			A				
A25-1A18/1C18	11	A27-2A27/2C27	11	9	A25A18			A				
A25-1A19/1C19	11	A25-1A14/1C14	11	3	A25A14			A				
A25-1A20/1C20	11	A27-2B30/2D30	11	9	A25A20			A				
A25-1A21/1C21	11	A23-2A03/2C03	11	6	A25A21			A				
A25-1A22/1C22	22	A24-1A42/1C42	22	5	A24A42			A				
A25-1A24/1C24	11	A27-1A24/1C24	11	4	A23A24			A				
A25-1A24/1C24	22	A23-1A24/1C24	22	4	A23A24			A				
A25-1A25/1C25	11	A27-1A25/1C25	11	4	A23A25			A				
A25-1A25/1C25	22	A23-1A25/1C25	22	4	A23A25			A				
A25-1A26/1C26	11	A27-1A26/1C26	11	4	A23A26			A				
A25-1A26/1C26	22	A23-1A26/1C26	22	4	A23A26			A				
A25-1A27/1C27	11	A27-1A27/1C27	11	4	A23A27			A				
A25-1A27/1C27	22	A23-1A27/1C27	22	4	A23A27			A				
A25-1A28/1C28	11	A24-1B40/1D40	11	4	A25A83			A				

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PAGE   111  PACK        A25                                                                   DATE 87/05/22.
     ORIGIN         LEVS    DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ---------- QSE
     A25-1A28/1C28  22          A26-1A28/1C28  22     3   A25A83                A

     A25-1A29/1C29  11          A24-2B37/2D37  11     9   A25A29                A

     A25-1A30/1C30  11          A24-2A13/2C13  11     6   A25A30                A

     A25-1A31/1C31  11          A24-1A21/1C21  11     4   A25A31                A

     A25-1A32/1C32  11          A24-2A19/2C19  11     7   A25A32                A

     A25-1A33/1C33  11          A24-2A36/2C36  11     8   A24A86                A

     A25-1A35/1C35  11          A23-1B35/1D35  11     3   A23B35                A
     A25-1A35/1C35  22          A26-1A35/1C35  22     3   A23B35                A

     A25-1A36/1C36  11          A26-1A19/1C19  11     4   A25A36                A

     A25-1A37/1C37  11          A24-2A29/2C29  11     7   A25A37                A

     A25-1A38/1C38  11          A24-2A11/2C11  11     5   A25A38                A

     A25-1A40/1C40  11          A24-2A12/2C12  11     5   A24A62                A

     A25-1A41/1C41  11          A26-1A41/1C41  11     3   A23B55                A
     A25-1A41/1C41  22          A23-2B05/2D05  22     5   A23B55                A

     A25-1A42/1C42  11          A22-1B17/1D17  11     5   A22B17                A

     A25-1A43/1C43  11          A24-1A33/1C33  11     4   A25A43                A

     A25-1B03/1D03  11          A18-2B19/2D19  11    13   A18B69                A

     A25-1B04/1D04  11          A18-1A32/1C32  11    13   A18A32                A        F

     A25-1B05/1D05  22          A22-1B05/1D05  22     3   A18A79                A        F

     A25-1B07/1D07  11          A24-2A38/2C38  11    11   A25B07                A

     A25-1B08/1D08  22          A21-1B08/1D08  22     5   A18B08                A

     A25-1B09/1D09  22          A21-1B09/1D09  22     5   A18B09                A

     A25-1B10/1D10  22          A21-1B10/1D10  22     5   A18B10                A

     A25-1B11/1D11  22          A21-1B11/1D11  22     5   A18B11                A

     A25-1B12/1D12  11          A21-1B38/1D38  11     6   A21B38                A
     A25-1B12/1D12  22          A26-1B12/1D12  22     3   A21B38                A

     A25-1B13/1D13  11          A26-1B32/1D32  11     4   A26B32                A

     A25-1B14/1D14  11          A27-2A26/2C26  11     9   A25B14                A

     A25-1B15/1D15  11          A27-2B29/2D29  11    10   A25B15                A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	DESCRIPTION	QSE
A25-1B16/1D16	11	A27-2A29/2C29	11	9	A25B16			A				
A25-1B17/1D17	11	A25-1B34/1D34	11	4	A25B17			A				
A25-1B18/1D18	11	A23-1A12/1C12	11	4	A25B18			A				
A25-1B19/1D19	11	A27-2B27/2D27	11	9	A25B19			A				
A25-1B20/1D20	11	A25-2B25/2D25	11	9	A25B75			A				
A25-1B21/1D21	11	A27-2A30/2C30	11	9	A25B21			A				
A25-1B24/1D24	11	A27-1B24/1D24	11	4	A23B24			A				
A25-1B24/1D24	22	A23-1B24/1D24	22	4	A23B24			A				
A25-1B25/1D25	11	A27-1B25/1D25	11	4	A23B25			A				
A25-1B25/1D25	22	A23-1B25/1D25	22	4	A23B25			A				
A25-1B26/1D26	11	A27-1B26/1D26	11	4	A23B26			A				
A25-1B26/1D26	22	A23-1B26/1D26	22	4	A23B26			A				
A25-1B27/1D27	11	A27-1B27/1D27	11	4	A23B27			A				
A25-1B27/1D27	22	A23-1B27/1D27	22	4	A23B27			A				
A25-1B28/1D28	11	A24-2A28/2C28	11	8	A25B28			A				
A25-1B30/1D30	11	A24-2B14/2D14	11	7	A25B30			A				
A25-1B33/1D33	11	A24-2B36/2D36	11	8	A24B86			A				
A25-1B34/1D34	11	A25-1B17/1D17	11	4	A25B17			A				
A25-1B34/1D34	22	A26-1B34/1D34	22	3	A25B17			A				
A25-1B36/1D36	11	A26-1B37/1D37	11	3	A26B37			A				
A25-1B38/1D38	11	A24-1B36/1D36	11	3	A25B38			A				
A25-1B40/1D40	22	A24-2A25/2C25	22	7	A22A55			A				
A25-1B41/1D41	11	A23-1A40/1C40	11	4	A23A40			A				
A25-1B42/1D42	11	A23-2B20/2D20	11	6	A23B70			A				
A25-1B43/1D43	11	A24-1A36/1C36	11	4	A25B43			A				
A25-2A04/2C04	11	A27-1B37/1D37	11	5	A27B37			A				
A25-2A05/2C05	11	A27-1A40/1C40	11	5	A27A40			A				
A25-2A07/2C07	11	A27-2A07/2C07	11	4	A23A57			A				
A25-2A07/2C07	22	A23-2A07/2C07	22	4	A23A57			A				
A25-2A08/2C08	11	A27-2A08/2C08	11	4	A23A58			A				

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ORIGIN          LEVS       DESTINATION      LEVS  LTH   SIGNAL   CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ---------- QSE

A25-2A08/2C08   22           A23-2A08/2C08   22     4   A23A58                 A

A25-2A09/2C09   11           A27-2A09/2C09   11     4   A23A59                 A
A25-2A09/2C09   22           A23-2A09/2C09   22     4   A23A59                 A

A25-2A10/2C10   11           A27-2A10/2C10   11     4   A23A60                 A
A25-2A10/2C10   22           A23-2A10/2C10   22     4   A23A60                 A

A25-2A11/2C11   11           A27-1A38/1C38   11     6   A27A38                 A

A25-2A12/2C12   11           A27-1B42/1D42   11     5   A27B42                 A

A25-2A13/2C13   11           A23-2A17/2C17   11     4   A25A63                 A

A25-2A14/2C14   22           A24-2A22/2C22   22     3   A25A64                 A

A25-2A15/2C15   11           A24-1B32/1D32   11     6   A25A65                 A

A25-2A16/2C16   22           A24-2B41/2D41   22     5   A22A83                 A

A25-2A17/2C17   11           A26-2A17/2C17   11     3   A23B41                 A
A25-2A17/2C17   22           A22-1B36/1D36   22     7   A23B41                 A

A25-2A18/2C18   11           A22-1A38/1C38   11     7   A22A38                 A

A25-2A24/2C24   11           A27-1B10/1D10   11    10   A27B10                 A

A25-2A25/2C25   11           A26-1B20/1D20   11     9   A25A75                 A

A25-2A27/----                A25-2C27/----              GRNDXX                 A

A25-2A30/2C30   11           A24-2A09/2C09   11     5   A25A80                 A

A25-2A31/2C31   11           A24-2A37/2C37   11     3   A24A87                 A

A25-2A32/2C32   11           A24-2B05/2D05   11     5   A24B55                 A

A25-2A33/2C33   22           A27-2A16/2C16   22     5   A25A83                 A

A25-2A34/2C34   22           A22-2A34/2C34   22     4   A18A84                 A

A25-2A35/----                A25-2C35/----              GRNDXX                 A

A25-2A37/2C37   11           A24-2A18/2C18   11     4   A25A87                 A

A25-2A40/2C40   11           A24-1A40/1C40   11     8   A25A90                 A

A25-2A41/2C41   11           A24-2B35/2D35   11     3   A25A91                 A

A25-2A42/2C42   11           A24-2A35/2C35   11     3   A25A92                 A

A25-2A43/2C43   11           A24-2B13/2D13   11     6   A24B63                 A

A25-2B03/2D03   11           A23-2A20/2C20   11     5   A23A70                 A
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ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------	QSE
A25-2B03/2D03	22	A26-2B03/2D03	22	3	A23A70			A			
A25-2B04/2D04	11	A27-1B41/1D41	11	5	A27B41			A			
A25-2B05/2D05	11	A27-1B40/1D40	11	5	A27B40			A			
A25-2B07/2D07	11	A27-2B07/2D07	11	4	A23B57			A			
A25-2B07/2D07	22	A23-2B07/2D07	22	4	A23B57			A			
A25-2B08/2D08	11	A27-2B08/2D08	11	4	A23B58			A			
A25-2B08/2D08	22	A23-2B08/2D08	22	4	A23B58			A			
A25-2B09/2D09	11	A27-2B09/2D09	11	4	A23B59			A			
A25-2B09/2D09	22	A23-2B09/2D09	22	4	A23B59			A			
A25-2B10/2D10	11	A27-2B10/2D10	11	4	A23B60			A			
A25-2B10/2D10	22	A23-2B10/2D10	22	4	A23B60			A			
A25-2B11/2D11	11	A27-1A41/1C41	11	5	A27A41			A			
A25-2B12/2D12	11	A27-1A42/1C42	11	5	A27A42			A			
A25-2B13/2D13	11	A23-2A21/2C21	11	4	A23A71			A			
A25-2B13/2D13	22	A27-1B12/1D12	22	8	A23A71			A			
A25-2B14/2D14	11	A24-1B43/1D43	11	5	A24B43			A			
A25-2B14/2D14	22	A26-2B14/2D14	22	3	A24B43			A			
A25-2B15/2D15	11	A23-2A22/2C22	11	4	A23A72			A			
A25-2B15/2D15	22	A26-2B15/2D15	22	3	A23A72			A			
A25-2B16/2D16	11	A26-2B16/2D16	11	3	A23B37			A			
A25-2B16/2D16	22	A22-1A33/1C33	22	7	A23B37			A			
A25-2B17/2D17	11	A26-2B17/2D17	11	3	A23A41			A			
A25-2B17/2D17	22	A22-1A36/1C36	22	7	A23A41			A			
A25-2B18/2D18	11	A26-2B18/2D18	11	3	A23A42			A			
A25-2B18/2D18	22	A22-1A37/1C37	22	7	A23A42			A			
A25-2B22/2D22	11	A27-1A37/1C37	11	7	A27A37			A			
A25-2B25/2D25	11	A25-1B20/1D20	11	9	A25B75			A			
A25-2B27/----		A25-2D27/----			GRNDXX			A			
A25-2B28/2D28	11	A27-2A03/2C03	11	5	A27A53			A			
A25-2B29/2D29	11	A26-2A29/2C29	11	3	A26A79			A			
A25-2B30/2D30	11	A24-2B17/2D17	11	4	A25B80			A			
A25-2B31/2D31	11	A26-2B31/2D31	11	3	A18B81			A			
A25-2B31/2D31	22	A23-2B31/2D31	22	4	A18B81			A			

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PAGE   115  PACK        A25                                                                                     DATE 87/05/22.
     ORIGIN        LEVS      DESTINATION     LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A25-2B32/2D32  11         A22-1A35/1C35  11     8   A22A35                 A

     A25-2B33/2D33  22         A21-2B33/2D33  22     5   A18B83                 A

     A25-2B34/2D34  22         A21-2B34/2D34  22     5   A18B84                 A

     A25-2B36/2D36  11         A23-2A27/2C27  11     4   A23A77                 A
     A25-2B36/2D36  22         A26-2B36/2D36  22     3   A23A77                 A

     A25-2B37/2D37  11         A24-2A17/2C17  11     5   A25B87                 A

     A25-2B38/2D38  11         A24-2B03/2D03  11     6   A24B53                 A
     A25-2B38/2D38  22         A26-2B38/2D38  22     3   A24B53                 A

     A25-2B40/2D40  11         A24-2B12/2D12  11     5   A24B62                 A
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ORIGIN          LEVS       DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

A26-1A05/1C05  22           A25-1A05/1C05  22      3    A18A83                A         F
A26-1A08/1C08  22           A21-1A12/1C12  22      6    A18A12                A
A26-1A09/1C09  22           A21-1A13/1C13  22      6    A18A13                A
A26-1A10/1C10  22           A21-1A14/1C14  22      6    A18A14                A
A26-1A11/1C11  22           A21-1A15/1C15  22      6    A18A15                A
A26-1A12/1C12  22           A25-1A12/1C12  22      3    A22B84                A
A26-1A13/1C13  11           A24-2A03/2C03  11      7    A26A13                A
A26-1A15/1C15  11           A27-1B14/1D14  11      3    A26A15                A
A26-1A16/1C16  22           A21-1B16/1D16  22      5    A18B16                A
A26-1A17/1C17  11           A27-1A11/1C11  11      3    A26A17                A
A26-1A18/1C18  11           A27-1B19/1D19  11      3    A26A18                A
A26-1A19/1C19  11           A25-1A36/1C36  11      4    A25A36                A
A26-1A20/1C20  11           A27-1B20/1D20  11      3    A26A20                A

A26-1A24/1C24  11           A24-2B16/2D16  11      7    A23A28                A
A26-1A24/1C24  22           A23-1A28/1C28  22      4    A23A28                A

A26-1A25/1C25  11           A24-2B15/2D15  11      7    A23A29                A
A26-1A25/1C25  22           A23-1A29/1C29  22      4    A23A29                A

A26-1A26/1C26  11           A24-2B11/2D11  11      7    A23A30                A
A26-1A26/1C26  22           A23-1A30/1C30  22      4    A23A30                A

A26-1A27/1C27  11           A24-2B10/2D10  11      7    A23A31                A
A26-1A27/1C27  22           A23-1A31/1C31  22      4    A23A31                A

A26-1A28/1C28  11           A27-2A16/2C16  11      7    A25A83                A
A26-1A28/1C28  22           A25-1A28/1C28  22      3    A25A83                A

A26-1A35/1C35  22           A25-1A35/1C35  22      3    A23B35                A
A26-1A40/----               A26-1C40/----               GRNDXX                A
A26-1A41/1C41  11           A25-1A41/1C41  11      3    A23B55                A
A26-1B08/1D08  22           A21-1B12/1D12  22      6    A18B12                A
A26-1B09/1D09  22           A21-1B13/1D13  22      6    A18B13                A
A26-1B10/1D10  22           A21-1B14/1D14  22      6    A18B14                A
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PAGE 117 PACK A26 DATE 87/05/22.

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ---------- QSE
A26-1B11/1D11	22	A21-1B15/1D15	22	6	A18B15			A		
A26-1B12/1D12	22	A25-1B12/1D12	22	3	A21B38			A		
A26-1B14/1D14	11	A27-1A13/1C13	11	3	A26B14			A		
A26-1B15/1D15	11	A27-1A14/1C14	11	3	A26B15			A		
A26-1B16/1D16	11	A27-1B15/1D15	11	3	A26B16			A		
A26-1B19/1D19	11	A27-1A19/1C19	11	3	A26B19			A		
A26-1B20/1D20	11	A25-2A25/2C25	11	9	A25A75			A		
A26-1B21/1D21	11	A27-1A20/1C20	11	3	A26B21			A		
A26-1B24/1D24	11	A24-2A15/2C15	11	7	A23B28			A		
A26-1B24/1D24	22	A23-1B28/1D28	22	4	A23B28			A		
A26-1B25/1D25	11	A24-2A14/2C14	11	7	A23B29			A		
A26-1B25/1D25	22	A23-1B29/1D29	22	4	A23B29			A		
A26-1B26/1D26	11	A24-2A10/2C10	11	7	A23B30			A		
A26-1B26/1D26	22	A23-1B30/1D30	22	4	A23B30			A		
A26-1B27/1D27	11	A24-2B09/2D09	11	6	A23B31			A		
A26-1B27/1D27	22	A23-1B31/1D31	22	4	A23B31			A		
A26-1B28/1D28	11	A24-2A16/2C16	11	7	A26B28			A		
A26-1B32/1D32	11	A25-1B13/1D13	11	4	A26B32			A		
A26-1B34/1D34	22	A25-1B34/1D34	22	3	A25B17			A		
A26-1B37/1D37	11	A25-1B36/1D36	11	3	A26B37			A		
A26-1B41/1D41	11	A23-1B38/1D38	11	4	A23B38			A		
A26-2A04/2C04	11	A27-2B32/2D32	11	5	A27B82			A		
A26-2A05/2C05	11	A27-2A38/2C38	11	6	A27A88			A		
A26-2A07/2C07	22	A23-2A11/2C11	22	4	A23A61			A		
A26-2A08/2C08	22	A23-2A12/2C12	22	4	A23A62			A		
A26-2A09/2C09	22	A23-2A13/2C13	22	4	A23A63			A		
A26-2A10/2C10	22	A23-2A14/2C14	22	4	A23A64			A		
A26-2A11/2C11	11	A27-2A35/2C35	11	5	A27A85			A		
A26-2A12/2C12	11	A27-2B40/2D40	11	5	A27B90			A		

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE ---------- DESCRIPTION ----------- QSE
A26-2A17/2C17	11	A25-2A17/2C17	11	3	A23B41			A		
A26-2A27/----		A26-2C27/----			GRNDXX			A		
A26-2A29/2C29	11	A25-2B29/2D29	11	3	A26A79			A		
A26-2A31/2C31	11	A24-1B26/1D26	11	9	A24B26			A		
A26-2A35/----		A26-2C35/----			GRNDXX			A		
A26-2A38/2C38	22	A24-1B24/1D24	22	10	A26A88			A		
A26-2B03/2D03	22	A25-2B03/2D03	22	3	A23A70			A		
A26-2B04/2D04	11	A27-2A32/2C32	11	5	A27A82			A		
A26-2B05/2D05	11	A27-2A36/2C36	11	6	A27A86			A		
A26-2B07/2D07	22	A23-2B11/2D11	22	4	A23B61			A		
A26-2B08/2D08	22	A23-2B12/2D12	22	4	A23B62			A		
A26-2B09/2D09	22	A23-2B13/2D13	22	4	A23B63			A		
A26-2B10/2D10	22	A23-2B14/2D14	22	4	A23B64			A		
A26-2B11/2D11	11	A27-2B42/2D42	11	6	A27B92			A		
A26-2B12/2D12	11	A27-2B38/2D38	11	5	A27B88			A		
A26-2B14/2D14	22	A25-2B14/2D14	22	3	A24B43			A		
A26-2B15/2D15	22	A25-2B15/2D15	22	3	A23A72			A		
A26-2B16/2D16	11	A25-2B16/2D16	11	3	A23B37			A		
A26-2B17/2D17	11	A25-2B17/2D17	11	3	A23A41			A		
A26-2B18/2D18	11	A25-2B18/2D18	11	3	A23A42			A		
A26-2B22/2D22	11	A27-2A33/2C33	11	4	A27A83			A		
A26-2B27/----		A26-2D27/----			GRNDXX			A		
A26-2B28/2D28	11	A27-1A10/1C10	11	10	A27A10			A		
A26-2B30/2D30	11	A24-2A33/2C33	11	4	A26B80			A		
A26-2B31/2D31	11	A25-2B31/2D31	11	3	A18B81			A		
A26-2B36/2D36	22	A25-2B36/2D36	22	3	A23A77			A		
A26-2B38/2D38	22	A25-2B38/2D38	22	3	A24B53			A		

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	---------- DESCRIPTION -----------	QSE
A27-1A09/1C09	11	A21-1A22/1C22	11	6	A21A22			A				
A27-1A10/1C10	11	A26-2B28/2D28	11	10	A27A10			A				
A27-1A11/1C11	11	A26-1A17/1C17	11	3	A26A17			A				
A27-1A12/1C12	11	A24-2A04/2C04	11	8	A24A54			A				
A27-1A13/1C13	11	A26-1B14/1D14	11	3	A26B14			A				
A27-1A14/1C14	11	A26-1B15/1D15	11	3	A26B15			A				
A27-1A16/1C16	11	A21-1B26/1D26	11	6	A21B26			A				
A27-1A17/1C17	11	A21-1B27/1D27	11	6	A21B27			A				
A27-1A18/1C18	11	A21-1B28/1D28	11	6	A21B28			A				
A27-1A19/1C19	11	A26-1B19/1D19	11	3	A26B19			A				
A27-1A20/1C20	11	A26-1B21/1D21	11	3	A26B21			A				
A27-1A21/1C21	11	A23-2A33/2C33	11	10	A23A83			A				
A27-1A22/1C22	11	A23-1A35/1C35	11	5	A23A35			A				
A27-1A24/1C24	11	A25-1A24/1C24	11	4	A23A24			A				
A27-1A24/1C24	22	A24-2A32/2C32	22	9	A23A24			A				
A27-1A25/1C25	11	A25-1A25/1C25	11	4	A23A25			A				
A27-1A25/1C25	22	A24-2B31/2D31	22	9	A23A25			A				
A27-1A26/1C26	11	A25-1A26/1C26	11	4	A23A26			A				
A27-1A26/1C26	22	A24-2B28/2D28	22	9	A23A26			A				
A27-1A27/1C27	11	A25-1A27/1C27	11	4	A23A27			A				
A27-1A27/1C27	22	A24-2B27/2D27	22	8	A23A27			A				
A27-1A28/1C28	11	A21-1A24/1C24	11	6	A21A24			A				
A27-1A29/1C29	11	A21-1A25/1C25	11	6	A21A25			A				
A27-1A30/1C30	11	A24-1A32/1C32	11	4	A24A32			A				
A27-1A31/1C31	11	A21-1A26/1C26	11	6	A21A26			A				
A27-1A32/1C32	11	A21-1A27/1C27	11	6	A21A27			A				
A27-1A33/1C33	11	A21-1A28/1C28	11	6	A21A28			A				
A27-1A34/1C34	11	A21-1B30/1D30	11	6	A21B30			A				
A27-1A37/1C37	11	A25-2B22/2D22	11	7	A27A37			A				

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PAGE   120  PACK        A27                                                                                         DATE 87/05/22.
     ORIGIN         LEVS       DESTINATION      LEVS  LTH   SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

     A27-1A38/1C38  11           A25-2A11/2C11  11     6    A27A38                A
     A27-1A40/1C40  11           A25-2A05/2C05  11     5    A27A40                A
     A27-1A41/1C41  11           A25-2B11/2D11  11     5    A27A41                A
     A27-1A42/1C42  11           A25-2B12/2D12  11     5    A27A42                A
     A27-1B04/----               A27-1D04/----              GRNDXX                A
     A27-1B08/----               A27-1D08/----              GRNDXX                A
     A27-1B10/1D10  11           A25-2A24/2C24  11    10    A27B10                A
     A27-1B12/1D12  22           A25-2B13/2D13  22     8    A23A71                A
     A27-1B13/1D13  11           A24-2A08/2C08  11     8    A27B13                A
     A27-1B14/1D14  11           A26-1A15/1C15  11     3    A26A15                A
     A27-1B15/1D15  11           A26-1B16/1D16  11     3    A26B16                A
     A27-1B16/----               A27-1D16/----              GRNDXX                A
     A27-1B18/1D18  11           A24-2B43/2D43  11    11    A24B93                A
     A27-1B19/1D19  11           A26-1A18/1C18  11     3    A26A18                A
     A27-1B20/1D20  11           A26-1A20/1C20  11     3    A26A20                A
     A27-1B21/1D21  11           A22-1A17/1C17  11     6    A22A17                A
     A27-1B21/1D21  22           A24-2A42/2C42  22    10    A22A17                A
     A27-1B22/1D22  11           A23-2B33/2D33  11    10    A23B83                A
     A27-1B24/1D24  11           A25-1B24/1D24  11     4    A23B24                A
     A27-1B24/1D24  22           A24-2A31/2C31  22     9    A23B24                A
     A27-1B25/1D25  11           A25-1B25/1D25  11     4    A23B25                A
     A27-1B25/1D25  22           A24-2B30/2D30  22     9    A23B25                A
     A27-1B26/1D26  11           A25-1B26/1D26  11     4    A23B26                A
     A27-1B26/1D26  22           A24-2A27/2C27  22     9    A23B26                A
     A27-1B27/1D27  11           A25-1B27/1D27  11     4    A23B27                A
     A27-1B27/1D27  22           A24-2A26/2C26  22     8    A23B27                A
     A27-1B30/1D30  11           A22-1A34/1C34  11     6    A22A34                A
     A27-1B33/1D33  11           A22-1B34/1D34  11     6    A22B34                A
     A27-1B35/1D35  11           A24-2B38/2D38  11     9    A24B88                A
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PAGE   121  PACK        A27                                                                                      DATE 87/05/22.
         ORIGIN         LEVS       DESTINATION      LEVS  LTH    SIGNAL  CBL  COLORS  REV  GA  TYPE ---------- DESCRIPTION ----------- QSE

         A27-1B37/1D37   11          A25-2A04/2C04   11     5    A27B37                 A

         A27-1B40/1D40   11          A25-2B05/2D05   11     5    A27B40                 A

         A27-1B41/1D41   11          A25-2B04/2D04   11     5    A27B41                 A

         A27-1B42/1D42   11          A25-2A12/2C12   11     5    A27B42                 A

         A27-2A03/2C03   11          A25-2B28/2D28   11     5    A27A53                 A

         A27-2A05/2C05   11          A24-2B22/2D22   11     5    A24B72                 A

         A27-2A07/2C07   11          A25-2A07/2C07   11     4    A23A57                 A

         A27-2A08/2C08   11          A25-2A08/2C08   11     4    A23A58                 A

         A27-2A09/2C09   11          A25-2A09/2C09   11     4    A23A59                 A

         A27-2A10/2C10   11          A25-2A10/2C10   11     4    A23A60                 A

         A27-2A12/2C12   11          A24-2B42/2D42   11     6    A24B92                 A

         A27-2A16/2C16   11          A26-1A28/1C28   11     7    A25A83                 A
         A27-2A16/2C16   22          A25-2A33/2C33   22     5    A25A83                 A

         A27-2A17/2C17   11          A24-2A30/2C30   11     5    A27A67                 A

         A27-2A26/2C26   11          A25-1B14/1D14   11     9    A25B14                 A

         A27-2A27/2C27   11          A25-1A18/1C18   11     9    A25A18                 A

         A27-2A29/2C29   11          A25-1B16/1D16   11     9    A25B16                 A

         A27-2A30/2C30   11          A25-1B21/1D21   11     9    A25B21                 A

         A27-2A32/2C32   11          A26-2B04/2D04   11     5    A27A82                 A

         A27-2A33/2C33   11          A26-2B22/2D22   11     4    A27A83                 A

         A27-2A35/2C35   11          A26-2A11/2C11   11     5    A27A85                 A

         A27-2A36/2C36   11          A26-2B05/2D05   11     6    A27A86                 A

         A27-2A38/2C38   11          A26-2A05/2C05   11     6    A27A88                 A

         A27-2A41/2C41   11          A22-2A03/2C03   11     7    A22A53                 A

         A27-2A43/2C43   11          A23-2A24/2C24   11     6    A23A74                 A

         A27-2B03/2D03   11          A24-2B33/2D33   11     6    A27B53                 A

         A27-2B07/2D07   11          A25-2B07/2D07   11     4    A23B57                 A

         A27-2B08/2D08   11          A25-2B08/2D08   11     4    A23B58                 A
```

ORIGIN	LEVS	DESTINATION	LEVS	LTH	SIGNAL	CBL	COLORS	REV	GA	TYPE	---------- DESCRIPTION -----------	QSE
A27-2B09/2D09	11	A25-2B09/2D09	11	4	A23B59			A				
A27-2B10/2D10	11	A25-2B10/2D10	11	4	A23B60			A				
A27-2B11/2D11	11	A23-2B21/2D21	11	5	A23B71			A				
A27-2B12/2D12	11	A24-2A43/2C43	11	6	A24A93			A				
A27-2B13/2D13	11	A24-2B32/2D32	11	5	A27B63			A				
A27-2B16/----		A27-2D16/----			GRNDXX			A				
A27-2B17/2D17	11	A23-2B24/2D24	11	5	A23B74			A				
A27-2B18/----		A27-2D18/----			GRNDXX			A				
A27-2B20/2D20	11	A23-2A25/2C25	11	5	A23A75			A				
A27-2B26/2D26	11	A25-1A15/1C15	11	9	A25A15			A				
A27-2B27/2D27	11	A25-1B19/1D19	11	9	A25B19			A				
A27-2B29/2D29	11	A25-1B15/1D15	11	10	A25B15			A				
A27-2B30/2D30	11	A25-1A20/1C20	11	9	A25A20			A				
A27-2B31/2D31	11	A24-1B25/1D25	11	9	A24B25			A				
A27-2B32/2D32	11	A26-2A04/2C04	11	5	A27B82			A				
A27-2B33/2D33	11	A22-2A04/2C04	11	7	A22A54			A				
A27-2B34/2D34	11	A25-1A17/1C17	11	10	A25A17			A				
A27-2B35/2D35	11	A23-2B26/2D26	11	5	A23B76			A				
A27-2B36/2D36	11	A23-2B34/2D34	11	5	A23B84			A				
A27-2B37/----		A27-2D37/----			GRNDXX			A				
A27-2B38/2D38	11	A26-2B12/2D12	11	5	A27B88			A				
A27-2B40/2D40	11	A26-2A12/2C12	11	5	A27B90			A				
A27-2B42/2D42	11	A26-2B11/2D11	11	6	A27B92			A				
A27-2B43/2D43	11	A22-2B03/2D03	11	7	A22B53			A				

10-124 CDC CYBER Channel Coupler

Wire Lists

Revision A

DWN	D.MICKELSON	6/14/84
CHKD	R. Haussler	6/20/84
IG	N Horning	7/26/84
G		7/26/84
PR	N Horning	7/26/84

CONTROL DATA

ARHOPS
CODE IDENT

TITLE CABLE TABS - CCC CYBER I/O	PREFIX A	DOCUMENT NO. 67185232		REV. C
FIRST USED ON FR205-A		SHEET 1 OF 8		

SHEET REVISION STATUS

8	7	6	5	4	3	2	1
					A	A	A
B	B	B	B	B	A	A	B
B	B	B	B	B	A	C	C

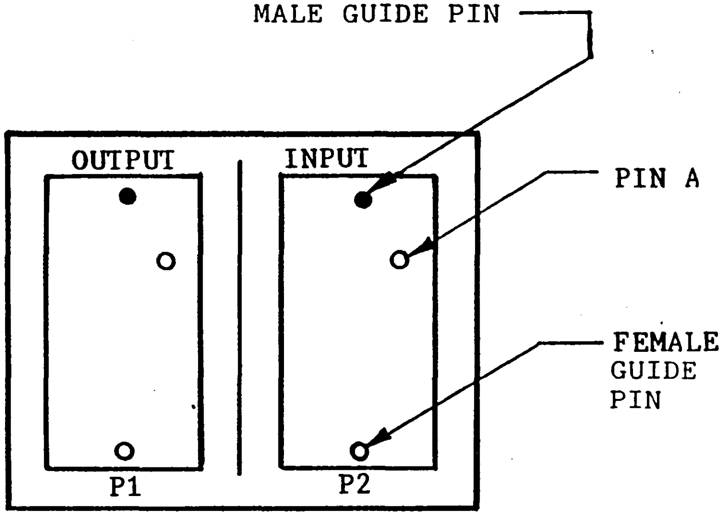
REVISION RECORD

REV	ECO	DESCRIPTION	DRFT	DATE	APP
A		CLASS A DRAWING	D.M.	6/14/4	N H
B	CA46912	SEE C.O.	leh	5-22-85	M.F.
C	CA48581	REVISE CHART, P2	M.F.	4/8/87	leh

NOTES:

DETACHED LISTS

CONTROL DATA CORPORATION	CABLE TABS-CCC CYBER I/O	CODE IDENT	SHEET 2	A	DOCUMENT NO. 67185232	REV. C



CONNECTOR BRACKET
BACK VIEW

FR205A/FV720A CABLE PLACEMENT REFERENCE PIN (●) LOCATION

TABLE 1	CHAN A	CHAN B
P1-J01	A01-2B18	B01-2B18
P1-J02	2B23	2B23
P1-J03	2B28	2B28
P1-J04	2B33	2B33
P1-J05	2B38	2B38
P2-J06	2A18	2A18
P2-J07	2A23	2A23
P2-J08	2A28	2A28
P2-J09	2A33	2A33
P2-J10	A01-2A38	B01-2A38

FR205B/FV720B CABLE PLACEMENT REFERENCE PIN (●) LOCATION

TABLE 2	CHAN A	CHAN B
P1-J01	A01-2B18	A15-2B18
P1-J02	2B23	2B23
P1-J03	2B28	2B28
P1-J04	2B33	2B33
P1-J05	2B38	2B38
P2-J06	2A18	2A18
P2-J07	2A23	2A23
P2-J08	2A28	2A28
P2-J09	2A33	2A33
P2-J10	A01-2A38	A15-2A38

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CONTROL DATA CORPORATION	CABLE TABS - CCC CYBER I/O	CODE IDENT	SHEET 3	A	DOCUMENT NO. 67185232	REV. A

OUTPUT CABLE P1

	C GND	B SIGNAL		
	○	●	PARITY	= P2-W
	○	○	JUMPER	
J01	○	○	MASTER CLEAR	= P2-V
	○	○	FUNCTION	= P2-U
	○	○	EMPTY	= P2-T
	○	●	JUMPER	
	○	○	FULL	= P2-S
J02	○	○	INACTIVE	= P2-R
	○	○	ACTIVE	= P2-P
	○	○	JUMPER	
	○	●	DATA 11	= P2-N
	○	○	DATA 10	= P2-M
J03	○	○	DATA 9	= P2-L
	○	○	JUMPER	
	○	○	DATA 8	= P2-K
	○	●	DATA 7	= P2-J
	○	○	DATA 6	= P2-H
J04	○	○	JUMPER	
	○	○	DATA 5	= P2-F
	○	○	DATA 4	= P2-E
	○	●	DATA 3	= P2-D
	○	○	JUMPER	
J05	○	○	DATA 2	= P2-C
	○	○	DATA 1	= P2-B
	○	○	DATA 0	= P2-A

INPUT CABLE P2

	A SIGNAL	D GND		
	●	○	PARITY	= P1-W
	○	○	JUMPER	
J06	○	○	1 MHZ CLOCK	= P1-V
	○	○	10 MHZ CLOCK	= P1-U
	○	○	EMPTY	= P1-T
	●	○	JUMPER	
	○	○	FULL	= P1-S
J07	○	○	INACTIVE	= P1-R
	○	○	ACTIVE	= P1-P
	○	○	JUMPER	
	●	○	DATA 11	= P1-N
	○	○	DATA 10	= P1-M
J08	○	○	DATA 9	= P1-L
	○	○	JUMPER	
	○	○	DATA 8	= P1-K
	●	○	DATA 7	= P1-J
	○	○	DATA 6	= P1-H
J09	○	○	JUMPER	
	○	○	DATA 5	= P1-F
	○	○	DATA 4	= P1-E
	●	○	DATA 3	= P1-D
	○	○	JUMPER	
J10	○	○	DATA 2	= P1-C
	○	○	DATA 1	= P1-B
	○	○	DATA 0	= P1-A

VIEWED FROM WIRE END
● =REFERENCE PIN

CONTROL DATA CORPORATION	CABLE ASSEMBLY CYBER I/O	CODE IDENT	SHEET 4	WL	DOCUMENT NO. 67185232	REV. B

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) m	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
	1	26	9	1.5	P1	A	2,3	J05	B5	5,12	OUTPUT DATA 2^0
↑	↑	↑	0	↑		GND	↑	↑	C5	↑	GND
			9		P1	B			B4		OUTPUT DATA 2^1
			0			GND			C4		GND
			9		P1	C			B3		OUTPUT DATA 2^2
			0			GND			C3		GND
			9		P1	D		↓	B1		OUTPUT DATA 2^3
			0			GND		J05	C1		GND
			9		P1	E		J04	B5		OUTPUT DATA 2^4
			0			GND		↑	C5		GND
			9		P1	F			B4		OUTPUT DATA 2^5
			0			GND			C4		GND
			9		P1	H			B2		OUTPUT DATA 2^6
			0			GND			C2		GND
			9		P1	J		↓	B1		OUTPUTDATA 2^7
			0			GND		J04	C1		GND
			9		P1	K		J03	B5		OUTPUTDATA 2^8
			0			GND		↑	C5		GND
↓	↓	↓	9	↓	P1	L	↓	↓	B3	↓	OUTPUTDATA 2^9
	1	26	0	1.5		GND	2,3	J03	C3	5,12	GND

AA3183 REV. 8/71

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CONTROL DATA CORPORATION	CABLE ASSEMBLY CYBER I/O	CODE IDENT	SHEET 5	WL	DOCUMENT NO. 67185232	REV. B

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) m	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
	1	26	9	1.5	P1	M	2,3	J03	B2	5, 12	OUTPUT DATA 2^{10}
			0			GND			C2		GND
			9		P1	N			B1		OUTPUT DATA 2^{11}
			0			GND		J03	C1		GND
			9		P1	P		J02	B4		ACTIVE
			0			GND			C4		GND
			9		P1	R			B3		INACTIVE
			0			GND			C3		GND
			9		P1	S			B2		FULL
			0			GND		J02	C2		GND
			9		P1	T		J01	B5		EMPTY
			0			GND			C5		GND
			9		P1	U			B4		FUNCTION
			0			GND			C4		GND
			9		P1	V			B3		MASTER CLEAR
			0			GND			C3		GND
			9		P1	W			B1		OUTPUT PARITY
	1	26	0	1.5		GND	2,3	J01	C1	5,12	GND

AA3183 REV. 8/71

PRINTED IN U.S.A.

CONTROL DATA CORPORATION	CABLE ASSEMBLY CYBER I/O	CODE IDENT	SHEET 6	W/L	DOCUMENT NO. 67185232	REV. B

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) m	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
	1	26	9	1.5	P2	M	2,3	J08	A2	5,12	INPUT DATA 2^{10}
			0			GND			D2		GND
			9		P2	N			A1		INPUT DATA 2^{11}
			0			GND		J08	D1		GND
			9		P2	P		J07	A4		ACTIVE
			0			GND			D4		GND
			9		P2	R			A3		INACTIVE
			0			GND			D3		GND
			9		P2	S			A2		FULL
			0			GND		J07	D2		GND
			9		P2	T		J06	A5		EMPTY
			0			GND			D5		GND
			9		P2	U			A4		10 MHZ CLOCK
			0			GND			D4		GND
			9		P2	V			A3		1 MHZ CLOCK
			0			GND			D3		GND
			9		P2	W			A1		INPUT PARITY
	1	26	0	1.5		GND	2,3	J06	D1	5,12	GND

AA3183 REV. 8/71

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CONTROL DATA CORPORATION

CABLE ASSEMBLY
CYBER I/O

CODE IDENT

SHEET 7

WL

DOCUMENT NO. 67185232

REV. B.

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) m	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
	1	26	9	1.5	P2	A	2,3	J10	A5	5,12	INPUT DATA 2^0
			0			GND			D5		GND
			9		P2	B			A4		INPUT DATA 2^1
			0			GND			D4		GND
			9		P2	C			A3		INPUT DATA 2^2
			0			GND			D3		GND
			9		P2	D			A1		INPUT DATA 2^3
			0			GND		J10	D1		GND
			9		P2	E		J09	A5		INPUT DATA 2^4
			0			GND			D5		GND
			9		P2	F			A4		INPUT DATA 2^5
			0			GND			D4		GND
			9		P2	H			A2		INPUT DATA 2^6
			0			GND			D2		GND
			9		P2	J			A1		INPUT DATA 2^7
			0			GND		J09	D1		GND
			9		P2	K		J08	A5		INPUT DATA 2^8
			0			GND			D5		GND
			9		P2	L			A3		INPUT DATA 2^9
	1	26	0	1.5		GND	2,3	J08	D3	5,12	GND

AA3183 REV. 8/71

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CONTROL DATA CORPORATION	CABLE ASSEMBLY CYBER I/O	CODE IDENT	SHEET 8	WL	DOCUMENT NO. 67185232	REV. B

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) mm	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
	8	26	BLACK	40.0	J05	B2	5,12	J05	C2	5,12	JUMPER
↑	↑	↑	↑	↑	J04	B3	↑	J04	C3	↑	↑
					J03	B4		J03	C4		
					J02	B5		J02	C5		
					J02	B1		J02	C1		
					J01	B2		J01	C2		
					J10	A2		J10	D2		
					J09	A3		J09	D3		
					J08	A4		J08	D4		
					J07	A5		J07	D5		
↓	↓	↓	↓	↓	J07	A1	↓	J07	D1	↓	↓
	8	26	BLACK	40.0	J06	A2	5,12	J06	D2	5,12	JUMPER

AA3183 REV. 8/71

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10-132 CDC CYBER Channel Coupler

Wire Lists

DWN	1/20/87	CONTROL DATA CORPORATION	TITLE CABLE TABS - CCC I/O, FIPS I/F METRIC	PREFIX A
CHKD	1/20/87			DOCUMENT NO. 22120961
NG	1/20/87			REV. A
FG	3/4/87	ARHOPS	FIRST USED ON FR205-B, FV720-B	SHEET 1 OF 9
PPR	1/20/87	CODE IDENT		

SHEET REVISION STATUS

9	8	7	6	5	4	3	2	1
A	A	A	A	A	A	A	A	A

REVISION RECORD

REV	ECO	DESCRIPTION	DRFT	DATE	APP
A		CLASS A	CD	1/20/87	SBU

Revision A

NOTES:
1. J1 AND J2 ARE USED WITH FR205-B.
2. J3 AND J4 ARE USED WITH FV720-B.
3. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE MM.

DETACHED LISTS

CONTROL DATA CORPORATION	CABLE TABS - CCC I/O, FIPS I/F METRIC	CODE IDENT	SHEET 2 of 9	A	DOCUMENT NO. 22120961	REV. A

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) MM	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS CHANNEL A TAG
		26	6	1000	J01	B02		A10 2D	29		GND
			2			B03		A10 2B	29		OPL IN
			6			B04		A10 2C	24		GND
			2			B05		A10 2A	24		ADR IN
			6			B07		A10 2D	19		GND
			2			B08		A10 2B	19		SEL IN
			6			B09		A12 2C	28		GND
			2			B10		A12 2A	28		ADR OUT
			6			B13		A12 2D	21		GND
			2			B12		A12 2B	21		SUP OUT
			6			D05		A10 2C	21		GND
			2			D04		A10 2A	21		STA IN
			6			D07		A10 1D	42		GND
			2			D06		A10 1B	42		SRV IN
			6			D08		A12 2C	22		GND
			2			D09		A12 2A	22		SEL OUT
			6			D10		A11 2C	22		GND
			2			D11		A11 2A	22		CMD OUT
			6			D12		A11 2D	20		GND
		26	2	1000	J01	D13		A11 2B	20		SRV OUT

3183 REV. 8/71

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CONTROL DATA CORPORATION	CABLE TABS - CCC I/O, FIPS I/F METRIC	CODE IDENT	SHEET 3 of 9	A.	DOCUMENT NO. 22120961	REV. A

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) MM	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS CHANNEL A TAG
		26	6	1000	J01	G02		A11 2D	21		GND
↑	↑	↑	2	↑	↑	G03	↑	A11 2B	21	↑	CLK OUT
			6			G04		A10-1C	43		GND
			2			G05		A10-1A	43		MTR IN
			6			G07		A10-2D	20		GND
			2			G08		A10 -2B	20		DAT IN
			6			G09		A11 2C	19		GND
			2			G10		A11 2A	19		DAT OUT
			6			G13		A12 2C	26		GND
			2			G12		A12 2A	26		HLD OUT
			6			J05		A12 2D	20		GND
			2			J04		A12 2B	20		MTR OUT
			6			J07		A10-2C	20		GND
			2			J06		A10-2A	20		REQ IN
			6			J10		A10 2C	34		GND
			2			J11		A10 2A	34		DIS IN
↓	↓		6			J12	↓	A12 2C	20	↓	GND
			2			J13		A12 2A	20		OPL OUT
		↓	6	↓	↓	J08					GND
		26	2	1000	J01	J09					SPARE

AA3103 REV. 8/71

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CONTROL DATA CORPORATION

CABLE TABS - CCC I/O, FIPS I/F METRIC

CODE IDENT

SHEET 4 of 9

A.

DOCUMENT NO. 22120961

REV. A

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) MM	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS CHANNEL A BUS 0
		26	6	1000	J02	B02		A13 2C	40		GND
			2			B03		A13 -2A	40		BUS 0 OUT P
			6			B04		A13 -2D	41		GND
			2			B05		A13 -2B	41		BUS 0 OUT 1
			6			B07		A13 .2C	34		GND
			2			B08		A13 -2A	34		BUS 0 OUT 3
			6			B09		A13 -2D	28		GND
			2			B10		A13 -2B	28		BUS 0 OUT 5
			6			B13		A13 -2C	19		GND
			2			B12		A13 -2A	19		BUS 0 OUT 7
			6			D05		A13 -2C	42		GND
			2			D04		A13 -2A	42		BUS 0 OUT 0
			6			D07		A13 -2C	37		GND
			2			D06		A13 -2A	37		BUS 0 OUT 2
			6			D08		A13 -2C	28		GND
			2			D09		A13 -2A	28		BUS 0 OUT 4
			6			D10		A13 .2D	19		GND
			2			D11		A13 -2B	19		BUS 0 OUT 6
			6			D12		A11 -2C	28		GND
		26	2	1000	J02	D13		A11 -2A	28		MKO OUT

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CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) MM	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS CHANNEL A BUS 0
		26	6	1000	J02	G02		A13 -1D	03		GND
			2			G03		A13 -1B	03		BUS 0 IN P
			6			G04		A13 -1C	03		GND
			2			G05		A13 -1A	03		BUS 0 IN 1
			6			G07		A13 -1C	08		GND
			2			G08		A13 -1A	08		BUS 0 IN 3
			6			G09		A13 1D	07		GND
			2			G10		A13 1B	07		BUS 0 IN 5
			6			G13		A13 -1C	04		GND
			2			G12		A13 -1A	04		BUS 0 IN 7
			6			J05		A13 -1D	05		GND
			2			J04		A13 -1B	05		BUS 0 IN 0
			6			J07		A13 -1D	11		GND
			2			J06		A13 -1B	11		BUS 0 IN 2
			6			J08		A13 -1C	07		GND
			2			J09		A13 -1A	07		BUS 0 IN 4
			6			J10		A13 -1C	05		GND
			2			J11		A13 -1A	05		BUS 0 IN 6
			6			J12					GND
		26	2	1000	J02	J13					SPARE

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CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) MM	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS CHANNEL B TAG
		26	6	1000	J03	B02		A242D	29		GND
↑	↑	↑	2	↑	↑	B03	↑	A242B	29	↑	OPL IN
			6			B04		A242C	24		GND
			2			B05		A242A	24		ADR IN
			6			B07		A242D	19		GND
			2			B08		A242B	19		SEL IN
			6			B09	7	A262C	28		GND
			2			B10		A262A	28		ADR OUT
			6			B13		A262D	21		GND
			2			B12		A262B	21		SUP OUT
			6			D05		A242C	21		GND
			2			D04		A242A	21		STA IN
			6			D07		A241D	42		GND
			2			D06		A241B	42		SRV IN
			6			D08		A262C	22		GND
			2			D09		A262A	22		SEL OUT
			6			D10		A252C	22		GND
			2			D11		A25 2A	22		CMD OUT
↓	↓	↓	6	↓	↓	D12	↓	A25 2D	20	↓	GND
		26	2	1000	J03	D13		A25 2B	20		SRV OUT

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CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) MM	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS CHANNEL B TAG
		26	6	1000	J03	G02		A25 2D	21		GND
↑	↑	↑	2	↑	↑	G03	↑	A25 2B	21	↑	CLK OUT
			6			G04		A24 1C	43		GND
			2			G05		A24 1A	43		MTR IN
			6			G07		A24 2D	20		GND
			2			G08		A24 2B	20		DAT IN
			6			G09		A25 2C	19		GND
			2			G10		A25 2A	19		DAT OUT
			6			G13		A26 2C	26		GND
			2			G12		A26 2A	26		HLD OUT
			6			J05		A26 2D	20		GND
			2			J04		A26 2B	20		MTR OUT
			6			J07		A24 2C	20		GND
			2			J06		A24 2A	20		REQ IN
			6			J10		A24 2C	34		GND
			2			J11		A24 2A	34		DIS IN
↓	↓	↓	6	↓		J12	↓	A26 2C	20	↓	GND
		26	2	1000		J13		A26 2A	20		OPL OUT
			6		↓	J08					GND
			2		J03	J09					SPARE

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CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) MM	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS CHANNEL B BUS 0
		26	6	1000	J04	B02		A27 2C	40		GND
			2			B03		A27 2A	40		BUS 0 OUT P
			6			B04		A27 2D	41		GND
			2			B05		A27 2B	41		BUS 0 OUT 1
			6			B07		A27 2C	34		GND
			2			B08		A27 2A	34		BUS 0 OUT 3
			6			B09		A27 2D	28		GND
			2			B10		A27 2B	28		BUS 0 OUT 5
			6			B13		A27 2C	19		GND
			2			B12		A27 2A	19		BUS 0 OUT 7
			6			D05		A27 2C	42		GND
			2			D04		A27 2A	42		BUS 0 OUT 0
			6			D07		A27 2C	37		GND
			2			D06		A27 2A	37		BUS 0 OUT 2
			6			D08		A27 2C	28		GND
			2			D09		A27 2A	28		BUS 0 OUT 4
			6			D10		A27 2D	19		GND
			2			D11		A27 2B	19		BUS 0 OUT 6
			6			D12		A25 2C	28		GND
		26	2	1000	J04	D13		A25 2A	28		MKO OUT

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CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX) MM	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS CHANNEL A BUS 0
		26	6	1000	J04	G02		A27 1D	03		GND
			2			G03		A27 1B	03		BUS 0 IN P
			6			G04		A27 1C	03		GND
			2			G05		A27 1A	03		BUS 0 IN 1
			6			G07		A27 1C	08		GND
			2			G08		A27 1A	08		BUS 0 IN 3
			6			G09		A27 1D	07		GND
			2			G10		A27 1B	07		BUS 0 IN 5
			6			G13		A27 1C	04		GND
			2			G12		A27 1A	04		BUS 0 IN 7
			6			J05		A27 1D	05		GND
			2			J04		A27 1B	05		BUS 0 IN 0
			6			J07		A27 1D	11		GND
			2			J06		A27 1B	11		BUS 0 IN 2
			6			J08		A27 1C	07		GND
			2			J09		A27 1A	07		BUS 0 IN 4
			6			J10		A27 1C	05		GND
			2			J11		A27 1A	05		BUS 0 IN 6
		26	6	1000	J04	J12					GND
			2			J13					SPARE

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Appendix

CYBER Channel Trace Tables A

The microcode for the CYBER channel side of the CYBER Channel Coupler (the coupler) writes a four-word trace during all normal operations. Normal operations include CYBER function codes and Op codes received from the internal processor. Upon detection of an error, the trace is changed to eight words and the error code and three additional information words are written into the trace and are displayed on the maintenance panel of the coupler.

Trace Memory Locations

The trace for the CYBER side resides in the coupler memory at locations $1E00_{16}$ through $1EFF_{16}$. These memory locations are used as follows.

Location_{16}	Content	Description
1E00	1E08	Starting Trace Address
1E01	00F0	Trace Length
1E02	XXXX	Next Trace Address
1E03	XXXX	Remaining Trace Length
1E04	0000	Microcode Revision
1E05	0000	Microcode Revision
1E06	0000	Microcode Revision
1E07	0000	Microcode Revision
1E08	XXXX	Trace
|	|	|
|	|	|
v	v	v
1EFF	XXXX	Trace

Trace Format

The trace format is shown in tables A-1 through A-4. The status word (word 3) indicates whether the trace is for a channel function or an Op Code, and if an additional four words are added for an error trace.

Table A-1. Normal Trace, Channel Function

Word	Description	Trace
1	Channel Function	8XXX
2	Control Flags	XXXX
3	Trace Status	0000
4	Status	00XX

Table A-2. Normal Trace, Op Code

Word	Description	Trace
1	Op Code	XXXX
2	Address	XXXX
3	Trace Status	4000
4	Status	00XX

Table A-3. Error Trace, Channel Function

Word	Description	Trace
1	Channel Function	8XXX
2	Control Flags	XXXX
3	Trace Status	8000
4	Status	00XX

Table A-4. Error Trace, Op Code

Word	Description	Trace
1	Op Code	XXXX
2	Address	XXXX
3	Trace Status	C000
4	Status	00XX

The trace words are defined as follows.

- Channel function: 12-bit CYBER function code same as location 0023_{16}.
- Control flags: Internal hardware status to microcode.

Bit	Description
00	Not Character Fill
01	Active or Pause
02	R2 Register Full
03	X1 Register Full
04	Op Code Altered
05	OK to Disconnect
06	Memory DB Register Full
07	Channel Parity Error
08	Memory Parity Error
09	Deadman Time-Out
10	Function
11	Microcode Master Clear
12	Length Equals Zero
13	DMA Complete
14	Processor Running
15	Processor Abnormal

- Trace Status:

Bit	Description
00 or 1	Channel Function
00	Error Trace
01	Opcode Trace
02 - 15	Not Used

- Status: Status from memory location 0024_{16}.

Bit	Description
00	Not Used
01	Not Used
02	Interaction Quicklook Complete
03	CYBER Quicklook Complete
04	Not Used
05	Not Used
06	Not Used
07	Not Used
08	Normal End
09	Channel Parity Error
10	Memory Parity Error
11	Deadman Timeout
12	Control Package Memory Parity Error
13	Transfer Indicator
14	Character Fill
15	Not Used

- Op Code: This is the Op-code command read from location 0020_{16}.
- Address: This is the address read from location 0021_{16}.
- Error Code: See tables A-1 and A-2 for a list of error codes. The error codes are output to the coupler maintenance panel for display.
- Info. 1: Varies with error code. See table A-5 and A-6.
- Info. 2: Varies with error code. See table A-5 and A-6.
- Info. 3: Varies with error code. See table A-5 and A-6.

Table A-5. Error Codes/Normal Operations

Hexadecimal Error Code	Info. 1	Info. 2	Info. 3	Status	Misc.	Description
1101	DB REG	ADRS REG	LEN REG	0020	DB REG word with parity error	Memory parity error
1102	DB REG	ADRS REG	LEN REG	0008	DB REG word with parity error	Control package memory parity error
1103	DB REG	ADRS REG	LEN REG	0000	DB REG word with parity error	Trace length is 0
1104	R REG	ADRS REG	LEN REG	0040	DB REG word with parity error	Channel parity error
1105	R REG	ADRS REG	LEN REG	0010	DB REG word with parity error	Deadman timeout
1106	DB REG	ADRS REG	LEN REG	0000	DB REG word with parity error	Trace length is 0 at location 1E01
1107	R REG	ADRS REG	LEN REG	0040	DB REG word with parity error	Channel FCN, parity error

Table A-6. Quicklook Errors

Hexadecimal Error Code	Info. 1	Info. 2	Info. 3	Status	Misc.	Description
1301	DB REG	ADRS REG	LEN REG	0000	Section 0	Length not 0
1302	DB REG	ADRS REG	LEN REG	0000	Section 0	Length is 0
1303	DB REG	ADRS REG	LEN REG	0000	Section 0	Length not 0
1304	DB REG	ADRS REG	LEN REG	0000	Section 0	Length is 0
1305	DB REG	ADRS REG	LEN REG	0000	Section 0	Length not 0
1306	DB REG	ADRS REG	LEN REG	0000	Section 0	Length is 0
1307	DB REG	ADRS REG	LEN REG	0000	Section 0	Length is 0

(Continued)

Table A-6. Quicklook Errors *(Continued)*

Hexa-decimal Error Code	Info. 1	Info. 2	Info. 3	Status	Misc.	Description
1308	DB REG	ADRS REG	LEN REG	0000	Section 0	Length not 0
1309	DB REG	ADRS REG	LEN REG	0000	Section 0	Length is 0
1310	DB REG	ADRS REG	LEN REG	0000	Section 0	Length not 0
1311	DB REG	ADRS REG	LEN REG	0000	Section 1	Length is 0
1312	DB REG	ADRS REG	LEN REG	0000	Section 1	Length not 0
1321	DB REG	ADRS REG	LEN REG	0000	Section 2	First Pop instruction failed
1322	DB REG	ADRS REG	LEN REG	0000	Section 2	Second Pop instruction failed
1323	DB REG	ADRS REG	LEN REG	0000	Section 2	Third Pop instruction failed
1323	DB REG	ADRS REG	LEN REG	0000	Section 2	Fourth Pop instruction failed
1325	DB REG	ADRS REG	LEN REG	0000	Section 2	Length not 0
1331	DB REG	ADRS REG	LEN REG	0000	Section 3	UDI bit test failed
1332	DB REG	ADRS REG	LEN REG	0000	Section 3	UDI shift 4 failed
1333	DB REG	ADRS REG	LEN REG	0000	Section 3	UDI shift 8 failed
1334	DB REG	ADRS REG	LEN REG	0000	Section 3	UDI shift 12 failed
1334	DB REG	ADRS REG	LEN REG	0000	Section 3	UDI bits 12 - 15 PROM data and bit test
1336	DB REG	ADRS REG	LEN REG	0000	Section 3	UDI SH = 4 PROM data and bit test
1337	DB REG	ADRS REG	LEN REG	0000	Section 3	UDI SH = 8 PROM data and bit test
1338	DB REG	ADRS REG	LEN REG	0000	Section 3	UDI SH = 12 PROM data and bit test
1341	DB REG	ADRS REG	LEN REG	0000	Section 4	UDI check A/D clock 1110

(Continued)

Table A-6. Quicklook Errors *(Continued)*

Hexadecimal Error Code	Info. 1	Info. 2	Info. 3	Status	Misc.	Description
1342	DB REG	ADRS REG	LEN REG	0000	Section 4	UDI check A/D clock 1101
1343	DB REG	ADRS REG	LEN REG	0000	Section 4	UDI check A/D clock 1011
1344	DB REG	ADRS REG	LEN REG	0000	Section 4	UDI check A/D clock 0111
1345	DB REG	ADRS REG	LEN REG	0000	Section 4	UDI check A/D clock 0001
1346	DB REG	ADRS REG	LEN REG	0000	Section 4	UDI check A/D clock 0010
1347	DB REG	ADRS REG	LEN REG	0000	Section 4	UDI check A/D clock 0100
1348	DB REG	ADRS REG	LEN REG	0000	Section 4	UDI check A/D clock 1000
1351	DB REG	ADRS REG	LEN REG	0000	Section 5	UDI check bit set/clear, bits 12 - 15
1352	DB REG	ADRS REG	LEN REG	0000	Section 5	UDI check bit set/clear, bits 8 - 15
1361	DB REG	ADRS REG	LEN REG	0000	Section 6	UDI check register file
1371	DB REG	ADRS REG	LEN REG	0008	Interaction quicklook	Control package memory parity error
1372	DB REG	ADRS REG	LEN REG	0020	Interaction quicklook	Memory parity error
1373	DB REG	ADRS REG	LEN REG	0000	Interaction quicklook	Length not 0 after memory read to register file and register file read to memory write

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